TRENDS IN SOUTH AFRICAN AGRICULTURAL LAND PRICES

By

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07 December, 2006

DECLARATION

I declare that the thesis hereby submitted by me for the PhD degree in Agricultural Economics at the University of the Free State is my own independent work and has not previously been submitted by me at another university/faculty. I further more cede the copyright of the thesis in favour of the University of the Free State.

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07 December, 2006

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ABSTRACT

In recent years, concern has been expressed over rising agricultural land prices in South Africa. A major concern was that this situation would impede the successful implementation of the on-going land reform programme. This study aimed to examine the trends and draw conclusions about their determinants against the backdrop of recent policy developments to restructure the agricultural sector and empower the black population to participate more effectively in the nation's agricultural economy. On the basis of a comprehensive literature review, it was established that land issues have played an important role in past and present configuration of the economy and politics of South Africa. In South Africa as elsewhere in the world, agricultural land prices are central to how land enters the political and economic equations for which reason they are important subjects for research as well as developmental interventions.

Despite the implementation of far-reaching governance reforms and agricultural restructuring over the past 12 years, no recent model of farmland prices has explicitly considered these new issues. This study therefore employed cointegration analysis to model the long-run and short-run dynamics of the relationships so as to identify the key determinants as well as attempt a tentative forecast within the constraints imposed by limited data availability to the extent that the available time series permits. To that extent, this study contributes in an important way to the debate and provides a basis for more sophisticated and focused work in the future.

Building on previous structural modelling of farmland prices in the country, but using much expanded and some new time series spanning forty-nine years, it was possible to establish clear patterns of relationships between real farmland prices and a range of macro-aggregates, including real interest rate on debt, the rate of inflation, real Gross Domestic Product (GDP) per capita, among others. The results suggest that real farmland prices have strong positive relationships with real

GDP per capita and real farm debt per hectare. The importance of real net farm income and the real exchange rate of the rand were also demonstrated. Although the inflation rate was found to be positively related with real farmland prices, the relationship was found to be insignificant. Overall, strong policy effects were confirmed by significant structural breaks in the series. But the fitted error correction model suggests that the systems rapidly adjust to its long-run equilibrium, with most of the deviations being corrected within the next year.

While there is no basis to conclude from the results that rising farmland prices are hurting the land reform process, there is no question that sudden increases in prices generate uncertainties and call for measures to ensure greater stability. Actions to moderate the impact of price increases on small-scale and emerging farmers should therefore be explored, particularly by making redistributable agricultural land more abundant and accessible to small-scale farmers unable to compete in the unregulated land market. This will include drawing from the existing pool of state land and purchasing indebted farms for redistribution. Adjusting the rate of interest to keep consumption spending in check can have additional benefits in land price stabilization. Importantly, a fixation on rising agricultural land prices may be diverting attention from the crucial support needed by newly settled farmers to make agricultural land more productive through improvements in the input delivery systems, extension services to enhance the knowledge base of new entrants into the farming business, rural road networks, etc.

Key words: Farmland Prices, land reform programme, Inflation, Exchange Rates, Foreign Buyers, Gross Domestic Product, Structural Breaks, Cointegration, Recursive analysis, Error Correction.

TRENDS IN SOUTH AFRICAN AGRICULTURAL LAND PRICES

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UITTREKSEL

In die onlangse verlede is kommer uitgespreek oor stygende landbougrondpryse in Suid-Afrika. Daar was veral besorgdheid dat die situasie die suksesvolle implementering van die voortgesette grondhervormingsprogram nadelig sal beïnvloed. Die doel met hierdie studie is om teen die agtergrond van onlangse beleidsontwikkeling, die landbousektor te herstruktureer en die swart bevolking te bemagtig om meer effektief deel te neem aan die landbou-ekonomie van die land, die tendense te ondersoek en te bepaal wat hulle dryf. Op grond van ’n omvattende literatuur-oorsig, is bevind dat grondsake in die vorige, sowel as die toekomstige beplanning van die ekonomie en politiek in Suid-Afrika ’n belangrike rol gespeel het en steeds speel. Soos elders in die wêreld, is die pryse van landbougrond die kern van hoe grond die politieke en ekonomiese vergelykings betree en daarom is dit belangrike onderwerpe vir navorsing sowel as ontwikkelingsintervensies.

Ten spyte van die implementering van verreikende regeringshervorming en landbou-herstrukturering programme gedurende die afgelope 12 jaar, het geen onlangse model vir landbougrondpryse hierdie nuwe sake in ag geneem nie. Daarom gebruik die studie ko-integrasie om die lang- en korttermyndinamika van dié verhoudings te modelleer om die sleutelveranderlikes te bepaal sowel as om ’n tentatiewe vooruitskouing te doen binne die beperkinge van beperkte data-beskikbaarheid soos deur die beskikbare tyd toegelaat.

Met inagneming van vorige strukturele modelle van landbougrondpryse in die land, maar deur gebruikmaking van langer tydperke van tot nege-en-veertig jaar, was dit moontlik om duidelike verbandhoudende patrone tussen reële landbougrondpryse en ’n reeks makro-veranderlikes, insluitend die reële rentekoers op skuld, die inflasiekoers en reële Bruto Binnelandse Produk (BBP) per kapita te bepaal. Resultate dui daarop dat pryse vir reële landbougrond sterk positief verband hou met reële BBP per kapita en reële boerderyskuld per hektaar. Die belangrikheid van reële netto

boerdery-inkomste en die reële wisselkoers van die rand, het ook na vore getree. Alhoewel die inflasiekoers positief verbind kon word met die reële pryse vir landbougrond, het die verband nie betekenisvol geblyk te wees. Oor die algemeen is sterk beleidsinvloede deur beduidende strukturele onderbrekings in die reeks bevestig. Volgens die gepaste fout-regstellingsmodel herstel die stelsel vinnig tot sy langtermyn balans, met die meeste van die afwykings wat in die volgende jaar reggestel word.

Terwyl daar glad nie uit die resultate afgelei kan word of stygende landbougrondpryse die grondhervormingsproses benadeel nie, is dit nie te betwyfel nie dat skielike prysstygings tot onsekerheid lei wat maatstawwe noodsaak om groter stabiliteit te verseker. Daar moet dus gekyk word na stappe om die uitwerking van prysverhogings op kleinskaal- en opkomende boere te verminder, veral deur die beskikbaarstelling van landbougrond meer volop en toeganklik te maak vir kleinskaalse boere wat nie op die onbeheerde grondmark kan meeding nie. Dit sal bestaande staatsgrond insluit, sowel as die aankoop van plase met ’n skuldlas, vir herverdeling. Die aanpassing van die rentekoers om verbruiksbesteding te beheer, kan bykomende voordele inhou om grondpryse te stabiliseer. Vaspenning van landbougrondpryse mag die aandag aflei van die dringende ondersteuning wat deur nuutgevestigde boere benodig word om landbougrond meer produktief te maak deur middel van verbeterings in die inset-leweringstelsels, voorligtingsdienste om nuwe toetreders tot die boerderybedryf se kennis te verbreed, landelike padnetwerke, ens.

Sleutelwoorde: Landbougrondpryse, grondhervormingsprogram, inflasie, wisselkoerse, oorsese kopers, Bruto Binnelandse Produk, strukturele onderbrekings, ineenskakeling, re-kursiewe ontleding, fout regstelling.

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ACRONYMS AND ABBREVIATIONS

ANC	African National Congress
AgriBBEE	Broad-based Black Economic Empowerment in Agriculture
ABSA	Amalgamated Bank of South Africa
ARMA	Autoregressive Moving Average
AP	Average Product
AC	Average Cost
ARVAR	Augmented Restricted Vector Autoregression test
ADF	Augmented Dickey-Fuller test
AUVAR	Augmented Unrestricted Vector Autoregression test
AIC	Akaike Information Criteria
AE	Adaptive Expectations
BC	Before the Birth of Christ
COSATU	Confederation of South African Trade Unions
CPI	Consumer Price Index
CLARA	Communal Land Rights Act
CGT	Capital Gains Tax
CASP	Comprehensive Agricultural Support Programme
CRDW	Cointegrating Regression Durbin-Watson
DBSA	Development Bank of South Africa
DoA	Department of Agriculture
DLA	Department of Land Affairs
DSP	Difference Stationary Processes
DW	Durbin-Watson test statistic
DF	Dickey-Fuller test
ERS	Economic Research Services (of the US Department of Agriculture)
ESTA	Extension of Security of Tenure Act
ECM	Error Correction Model
FAO	Food and Agriculture Organisation of the United Nations
FDI	Foreign Direct Investment

GDP	Gross Domestic Product
HPP	Highest Profit Point
HQC	Hannan-Quinn Criterion
HSRC	Human Sciences Research Council
ITDG	Intermediate Technology Development Group
IES	Income and Expenditure Survey
IMF	International Monetary Fund
JSE	Johannesburg Stock Exchange
LRAD	Land Redistribution for Agricultural Development
LPM	Landless People's Movement
MVP	Marginal Value Product
MC	Marginal Cost
MP	Marginal Product
ML	Maximum Likelihood
NE	Naïve Expectations
NPV	Net Present Value
NID	Normally and Independently Distributed
NDA	National Department of Agriculture
NGO	Non-Governmental Organisation
RDP	Reconstruction and Development Programme
RE	Rational Expectation
RSA	Republic of South Africa
RVAR	Restricted Vector Autoregression test
OLS	Ordinary Least Squares regression
PDI	Previously Disadvantaged Individual
PPP	Purchasing Power Parity
SABC	South African Broadcasting Corporation
SAFEX	South African Futures Exchange
SALGA	South African Local Government Association
SARB	South African Reserve Bank
SBC	Schwarz Bayesian Criterion
SD	Sustainable Development

SSA	Statistics South Africa
TP	Total Product
TSP	Trend Stationary Processes
UN	United Nations
UNDP	United Nations Development Programme
UNCED	United Nations Conference on Environment and Development
UNISA	University of South Africa
USDA	United States Department of Agriculture
UVAR	Unrestricted Vector Autoregression test
VAR	Vector Autoregression
VAT	Value Added Tax
VECM	Vector Error Correction Model
VOC	Vereenigde Oost-Indische Compagnie (Dutch acronym for "Dutch East India Company")
VMP	Value of Marginal Product
WCED	World Conference on Environment and Development

CHAPTER 1
INTRODUCTION

1.1 Background

The literature on "prices", "land", and "land prices", is vast and diverse. But the common thread running through the bulk of the writings is their importance to the livelihoods at the individual, human level, as well as the health and well-being of nations. All through history, prices have constituted a key object of interest. Prices are so important that they are often the basis for classifying the participants in the national economic life, depending on whether they set prices or take prices (that is, price-setters and price-takers). Depending also on their levels, prices have been vilified or praised by economic participants depending again on whether they produce or consume; that is a classification based on whether you pay the price or you ask the price.

According to Sanderson (2005) in a recent humorous article, when the "price is right", the wheels of politics, economics, and just about anything, move in earnest. Conversely, when prices go awry such as the runaway inflation that befell the Roman Empire and brought about its final downfall (Gibbon, 1776), their effects can be devastating. In our contemporary experience, prices have definitely not lost their sting as can be attested by the situation in many countries today. In 1977, former President Anwar Sadat of Egypt introduced policies that raised the prices of basic commodities, including bread, and sparked off some of the most violent protests in Egyptian history in the form of the infamous "Bread Riots" (El Amrani, 2004). Since then, the government has been more respectful of prices (El Amrani, 2004). According to Tsakok (1990), prices are both "costs and incomes", and therefore elicit responses from producers, intermediaries, and consumers alike. Regardless of what one's role is in society, he/she must be affected by prices in one way or the other. This is the reason price analysis is so vital to the study of agricultural economics since it forms the basis for assessing the pace and extent of economic development and how incomes and welfare are distributed in the economy.

Given that the responses of all these players fundamentally determine the mood and tempo of the political system, politicians are naturally interested, with the result that price analyses invariably become an investigation into current and potential political positions and attitudes.

On the subject of land, the literature is equally profuse. One definition sees land as the total area of dry surface of the earth (Lipsey, Sparks and Steiner, 1973). The Bible, the holy book of the Christian faith, records that land came into existence on the third day of creation when: "…God said, let the waters under the heaven be gathered together unto one place, and let the dry land appear, and it was so…" (Genesis 1:9). It forms one of the factors of production crucial to agriculture. Over the years, land has remained the primary asset about which there have been unending controversies and arguments throughout history. In pre-modern times, land was associated with agricultural production and this has continued till date. Development practitioners, as well as political commentators, see land as "…a fundamental basis for social production and reproduction…" (Mboya, 2000). In fact, at creation time, only an agricultural use was foreseen when God directed thus: "…let the (*land*) bring forth grass, the herb yielding seed, and the fruit tree yielding fruit after his kind…" (Genesis 1:11).

But land's uses go beyond agriculture. As the basis for human habitation in the form of housing and construction of recreational facilities, and roads that support the transportation of man and goods, land can easily be described as the backbone of modern economic systems as well as the prime driver of the development process in more ways than are commonly obvious. Understandably, it is often a matter of passionate debate when policymakers confront the problem of choosing between one use and the other for available land because of the substantial opportunity costs involved. This is often the case whether the choice is between agricultural use and the conservation of a nature reserve, between residential housing schemes and recreational facilities for the development of sporting skills, etc. This sort of problem is at the heart of the questions Agricultural economists began to ask about values in the early 1970s and define the distinction between practical and theoretical problems (Johnson and Zerby, 1973).

As a factor of production, land has a number of unique characteristics. The classical economists, through one of their most prolific mouthpieces, David Ricardo, described land as "…the original and inexhaustible powers of the soil". Even if this view has proved over-optimistic and somewhat unrealistic in the light of the substantial fertility losses that attend extensive soil erosion in many parts of the world, land has not lost its dominant place in production. In many cultures, land is both revered and worshipped as the source or sustainer of various forms of life on earth and the final resting place upon death. Farmers and landowners alike often have a strong attachment to the land (Damon, 2001). According to Levak (1956), cited by Damon (2001), "…because of long family connection with land, there is often intense emotional involvement…They tend to view their land as something more than a capital investment…" An analysis of land prices can therefore reasonably be as much about economics as about the social, political and cultural dimensions.

The "*ala*" (pronounced "*ani"* in some dialects) or land, among the Igbo's of southeastern Nigeria, is associated with spiritual powers and is often raised to the status of a deity. It is seen as the ultimate arbiter and judge when issues arise that modern systems of arbitration or redress cannot resolve. For the Igbo, calling upon "*ala*" when a dispute cannot be resolved represents the ultimate appeal to a most powerful deity considered to be above all others and is often the last resort, only evoked when every other means of conflict/dispute resolution has failed. After an appeal has been made to *"ala",* the matter is not re-visited, regardless of outcome.

An offence that is abhorred by everyone is labeled *"nso-ani"* or *"nso-ala"* (translated directly as a sin against the land) among the Igbos (Achebe, 1958). Jeppe (1980) cites a number of sub-Saharan African sources (see in particular Obi, 1963 and Nwabueze, 1972) to establish that the fundamental traditional principles regarding the relationship between man and land are similar to those observed in most South African indigenous tribal communities. In the South African cultures examined in his research, namely the Tswana, Zulu and Sotho, Jeppe (1980) showed that land ownership defines community membership much more than any other factors. The dominant customary pattern is that membership of a community imbues one with the right to land. Hence, the concept of

"landlessness" has no place within a setting where an individual can only lay claim to ancestry by virtue of land ownership within a given geographical location (Jeppe, 1980).

The ancient Minoans and Greeks prayed to an earth goddess (Van Schalkwyk, 1995) in much the same way that many African societies today construct concepts of the deity around the land as a powerful object of worship. A collection of contributed articles published by the Intermediate Technology Development Group (ITDG) took the title "*Land is Life*" and describes the high emotions rural people have towards their land (Adam, 1992; Dudley et al., 1992). According to Dudley et al. (1992), this often results in higher output once farmers are given full ownership of their land.

Given the complex and multiple uses, interactions, and belief systems surrounding land, in a way that lends more concreteness and meaning to the concept of "multi-functionality of agriculture" as now being popularized (DeVries, 2000), it is not surprising that land disputes go on in different parts of the world. The issue of "the conquered territories of Lesotho" (Lelimo, 1998) which continue to come up now and then is the consequence of disputes over land and lingering reactions to a phenomenon that is considered to have been motivated by the quest for land. Even today, many wars between nations and groups can be traced directly to differences of opinion over the ownership and control of land. Disputes continue to erupt now and then over the exact position of borders and boundaries. In fact, the First World Conference on land tenure problems held at the University of Minnesota in the United States, dwelt on the skewed distribution of landholdings, noting that many farms, especially in the traditional smallholder sectors of the developing countries, were too small to support even the most basic subsistence production, thus leading many farmers into a life of indebtedness and destitution (El-Ricaby, Velmonte, Costa, Dantwala, and Romero, 1952).

Land tenure systems relating to ownership patterns and whether or not land can be alienated and under what conditions merely reflect the significance attached to this resource by different societies. As can be seen quite easily, the more land serves other than productive purposes, the less easily is alienation or sale permitted. It is often the case that elaborate systems and mechanisms are created for controlling the asset and ensuring

that it remains within the society that owns it. In fact, in certain societies, it is so important that the traditional power élite has to hold it in trust for the rest of the community and no person can have other than usufructuary rights of an asset that virtually represents the soul of the society.

In South Africa, land remains an emotive issue. Commentators and researchers attribute this to the history of land as a tool in the hands of settlers for creating economic and social dichotomies in the country rather than its contribution to gross national output (Bundy, 1987; Mabin, 1991; Adams, Cousins, and Siyabulela, 2000, among others). Frost (1998) observes that to the South African black, land has both territorial significance as well as symbolic power that is intimately linked to their very identity as a people. Hence the bitterness about forced removals from their land, an action that was seen as a symbolic erasure of black identity and insights (Frost, 1998). According to the Reconstruction and Development Programme document (RDP), land is a "basic need" of the people of South Africa (African National Congress, 1994; Machete, 1995). However, agriculture, easily the main user of land worldwide, accounts for only 4.5% of South Africa's GDP, and roughly 11% of formal employment opportunities (Verschoor, 2003). Of course, the relatively low share of agriculture in South Africa's GDP is more a reflection of the strength of the sector and the diversity of the economy as a whole. Ultimately, land must play a more important role in a transformation process where a significant segment of the population is unemployed and do not have the skills for meaningfully participating in the economy outside agriculture.

The structure of the agricultural economy of South Africa means that land is the central productive resource and its ownership patterns are crucial where opportunities need to be equalized in the absence of alternative opportunities elsewhere in the economy (Bell, 1990; Van Zyl, Kirsten, and Binswanger, 1996). This is especially true for the majority of black population residing in the rural areas and entering the new South Africa from a background of limited opportunities to develop skills to participate in the modern, monetized economy. For this segment of the population, it is inevitable for the dominant empowerment strategies to include agriculture.

Given the inevitable current and projected roles of agriculture in creating new employment opportunities for the black population, and the central role of land in all this, how agricultural land is priced and distributed will continue to be important policy questions. How much land is bought and how profitably the new entrants into the farming business can operate are linked to how land is priced. Prices would normally signal the market possibilities on the basis of which prospective investors would make a decision. In the South African context, policymakers are understandably uncomfortable at the prospect of high agricultural land prices since these would only worsen an already ugly picture of the extreme skewedness of land distribution in the country, especially as many black people who buy land probably do so to make a statement about their inclusion rather than for real agricultural production purposes. This view seems to be borne out by the large number of absentee land-owners among the beneficiaries under the land reform programme.

In the 11 years since the enthronement of pluralistic democracy in the country, efforts to redress the imbalance have been feverish although the disparities remain. There is an understandable sense of unease among policymakers over what could easily pass off as a market-assisted discrimination in a country where legislative fiat sustained the dispossession of a particular group of their land for nearly a century (Lyne and Darroch, 2003; Moyo, 2004). There is also concern that a GDP growth rate of 5% and above does not seem to make a dent on the unemployment situation; between 1995 and 2002, the official unemployment rate doubled from about 15.9% to about 30.5% while the expanded rate of unemployment rose from 29.4% to 42.5% (DBSA, 2005).

Against this background, this thesis takes as a point of departure the groundswell of concern about the rising prices of farmland in South Africa and the considerable debate it has generated. Government itself has found this development somewhat embarrassing (Farmer's Weekly, 2004). Taking note that an elaborate and comprehensive programme is currently underway to empower black farmers targeted under the Broad-based Black Economic Empowerment in Agriculture or AgriBEE as it is popularly known, this is obviously an important question that has important practical implications and therefore deserves urgent academic as well as policy response. The **AgriBEE Framework,** as a

policy intervention in a democratic dispensation, specifically requires that land values are not impacted on negatively by the reform process (Department of Agriculture, 2004). This is understandable because a regime that counts on the support of an electorate in a democracy should strive to introduce measures that impart the maximum possible comfort to those whose votes count. A recognition of the critical linkages among livelihoods, markets, and institutions is certainly implicit (Dorward et al., 2001).

But economics takes a different view. In and of themselves, price movements are symptomatic of fundamental conditions that deserve to be studied or investigated and properly understood. Even though a populist perspective may be to stabilize agricultural land prices so that farmers acquire land at the lowest prices possible, the discipline of economics sees it differently. If the underlying conditions are well understood, policy measures may be introduced which allow the system to adjust to the new price regimes and continue to meet the objectives of employment creation, income generation, poverty alleviation, food security, and other ends of public policy within any economy.

Agricultural land prices may in fact serve as mechanism for rationing scarce resources so that they can be applied to their best alternative uses for the good of the larger economy. Given this economic viewpoint, invariably an efficiency perspective, it is important, as already emphasized, to understand the phenomenon and have a basis for predicting the changes, even within narrow limits. Since agricultural land prices will definitely not move up and down, i.e. fluctuate, in isolation, it is necessary to examine the factors influencing the observed trends and tendencies and examine the theory on the determinants of agricultural land prices globally and the trend with agricultural land values over the years in South Africa.

1.2 Problem Statement

South African agricultural sector has been notorious for the gross inequity in the distribution of land among the different races that make up the country's population. South Africa is one of the few countries of the world that is multiracial as a fundamental character rather than from immigration, with significant black and white populations that

claim ancestral rights to the country. The conventional wisdom is that all of Africa south of the Sahara is home to the black race, but the contemporary white population has, for several centuries, known no other home than South Africa and there is no denying that reality.

In some fundamental sense, much of the South African problem has been about land. The situation is that the white population, numbering about 5 million, constitutes the racial minority, while the black population is the dominant race in terms of numbers. The Native Land Act No. 27 of 1913 consigned the majority black population to just about 8% of the nation's 122 million hectares of land and limited to cultivate farmland within areas designated as "native reserves". Later, in 1936, the Native Trust and Land Act No. 18 of 1936, added some 6 million hectares of land to the stock in the "native reserves" to bring the proportion of total South African land available to the black population to a little over 13% (Department of Land Affairs/Agriculture, 2005).

Historically, the 1913 Act was only an extension of an earlier equally restrictive one that predated the formation of the Union of South Africa (Jordan, 1984). The earlier Act promulgated in 1894 and known as the Glen Grey Act, effectively ended communal land rights and allowed only limited tenure for the indigenous African population with the intention of forcing them to participate in the colonial cash economy from a position of weakness (Plaatje, 1916 - cited by DLA/DoA, 2005; Kirsten, Van Zyl & Vink, 1998; Hendricks, 2005; DBSA, 2005; Frye, 2006). This Act of 1894, which was passed during the Prime Ministership of the Mining Magnate Cecil Rhodes, succeeded in virtually completing the proletarianization of the African farmer and forcing him to accept mine employment, a central aim of the Act. It is also a matter of historical fact that this Act was instrumental to the completion of the annexation of the territories of the Transkei by the Cape.

These "native reserves" or black settlement areas were later re-designated "homelands" which were subsequently accorded phoney "independence" and became generally known as the "independent homelands" or "self-governing territories". The policies associated with the Native Land Act of 1913 are reputed for establishing a system that endowed the

white farmers with substantial privileges and subsidies which gave them an undue advantage over the black farmers. One of the most popular quotations today comes from the book, *Native Life in South Africa*, written by the first Secretary General of African National Congress (ANC), Mr. Sol Plaatjie, and palpably captures the mood of the times thus:

> "Awaking on Friday morning, June 20, 1913, the South African native found himself, not actually a slave, but a pariah in the land of his birth" (cited by DLA/DoA, 2005).

These policies that dispossessed the black population were accompanied by a strong farmer support programme exclusively targeting the white farmers and creating an illusion of a progressive agricultural economy that obscured some of the most serious cases of inefficiencies within the system at the time. These white farmers were the recipients of credits granted at less than half the going market rates as well as being recipients of state-subsidized farm infrastructure and extension assistance.

It was clear that the so-called "independent homelands" and "self-governing territories" lacked the fundamental basis for delivering welfare to the people. These areas featured the most extreme cases of infrastructure deficiencies, the most important of which, according to Van Zyl, Kirsten and Binswanger (1996), were inadequate market access, infrastructure and support services. Data available at the inception of democratic rule suggest that three million black farmers lived in these former homelands and produced food mostly for subsistence on much less than 17 million hectares of land (National Department of Agriculture, 2001).

The above situation contrasted sharply with the 50,000 – 60,000 large-scale commercial farmers who own or operate about 102 million hectares of land around the country (Van Schalkwyk, 1995; Ortmann and Machethe, 2003). Each of the white farmers controls a large expanse of land which was supplied with infrastructure facilities and allowed the operation of modern, market-oriented agriculture that is reputed to have generated some of the highest levels of food surpluses on the African continent. The era also featured

commodity boards which facilitated marketing of agricultural produce in a manner that afforded substantial security to the farmer in the disposal of produce.

When the new government led by the African National Congress (ANC) came to power in 1994, it made land reform the centre-piece of its reconstruction and development programme. Already in its "manifesto" entitled *The Reconstruction and Development Programme (RDP),* where its development blueprint was outlined, the African National Congress (ANC) had made no secret of its determination to fundamentally alter the pattern of land distribution and ownership in the country as part of a programme of agricultural restructuring and democratization. The new government was conscious of the fact that, even though democratic rule meant that Apartheid rules had been dismantled, their effects are still present in the form of well-laid infrastructural networks and know-how built over many years with substantial state subsidization (Matabese, 1993; Mbongwa, Van den Brink, and Van Zyl, 1996; Kinsey and Binswanger, 1996; Van Schalkwyk, Groenewald and Jooste, 2003).

It was therefore necessary to mount a programme that was at once radical but studied and methodical to ensure that the large number of policy objectives was taken on hand without compromising the important need for efficiency, food security, etc. According to the 1979 World Conference on Agrarian Reform and Rural Development, equitable distribution of land does not answer all the questions; the redistributed land has to be utilized efficiently for the ultimate objectives of rural development, human resource mobilization, increased production and poverty alleviation to be achieved (FAO, 1979; De Janvry, 1984).

There have been criticisms of the land reform programme since its inception. In the first place, there have been concerns over the pace of the programme which is considered very slow. Many years after the programme commenced, the vast majority of the black population is still excluded from the agricultural economy of the country. In the meantime, unemployment has been growing to the point that South Africa has one of the highest rates of unemployment in Africa, despite its strong economy and a highly sophisticated and technically efficient modern sector. By 1999, after about six years of

land reform, only about one million hectares of land, or some 1.2% of previously white-held land, had been redistributed (Turner and Ibsen, 2000).

Naturally, the government was restive, especially in the light of the growing tensions at the seemingly slow pace of the process. The Zimbabwean drama of land invasions and expulsion of white land owners was also beginning to unfold and it was not unlikely that the South African government had found those events a little unsettling. By the middle of 1999, the Minister of Agriculture called a halt to the implementation of the Settlement and Land Acquisition Grant (SLAG) and directed that a new programme be designed. In August 2001 the Land Redistribution for Agricultural Development (LRAD) programme was launched as one out of three funding mechanisms, the other two being the Municipal Commonage, and a repackaged SLAG.

However, the pace has remained extremely slow and growing discontent among the poor and landless raise concerns about the future of the programme. The programme was expected to transfer a total of 24 million ha of land from current uses, including white ownership, to the black population over a period of 15 years (DLA/DoA, 2005). By 2004, only about 3.5 million ha had been transferred to about 168,000 households. With this rate of transfer representing a mere 14% of the target, many have doubted the ability of the programme to meet its target. Luckily, the government has declared recently that the programme has reached a point where it is virtually self-propelling and implementation rate now depends on the budget allocation rather than other obstacles (DLA/DoA, 2005). There are also some claims that productivity levels and output have not been rising, and may actually have stagnated, as a result of a combination of several factors including the shortage of working capital and post-transfer support as well as the possibility that the group ownership mechanism is not working. In the absence of a comprehensive empirical evaluation of the on-going reform programme, it is only possible to comment on the basis of historical details on similar programmes.

The case of the establishment of black former employees of the Agriqwa in the 1980s as emerging farmers has been alluded to earlier. A recent rapid appraisal of the scheme shows that many of the farms are facing serious problems due to the discontinuation of

the support programmes implemented pre-1994. A few studies have gone beyond merely reviewing anecdotal evidence and have actually gone as far as collecting primary data to establish the true situation (Jordaan and Jooste, 2004). These studies have shown that the first generation emerging farmers established before the end of Apartheid are facing problems that reflect their reduced access to technical support. Of course, further assessments of the situation of the emerging, including those currently being resettled in the new, post-Apartheid era, will be necessary to definitively pronounce on the impact of farmer support programmes.

But nearly five years into the implementation of LRAD, the complaints remain. Just before the recent General Elections, the Landless Peoples Movement of the Eastern Cape threatened to invade white-owned farms instead of exercising their franchise at the polls (SABC-2, 2004). That they failed to do so may have been due to the persuasive powers or the stern warnings of the Minister of Agriculture. But that threat was only symptomatic of a general feeling of discontent that was recently alluded to by no less a person than the Minister of Finance, Mr. Trevor Manuel in presenting the Budget 2004, in drawing attention to the existence of a second economy characterized by homelessness, extreme income poverty, and other forms of destitution (Government of South Africa, 2004).

This growing pauperization of rural, as well as urban, South Africa, has been the subject of systematic studies in recent times. Analyses that made use of comparable consumption aggregates extracted from the Income and Expenditure Surveys (IES) have highlighted the worsening poverty since 1994. These analyses have shown that over the 5-6 year-period up to 2000, consumption growth has slowed to less than 1% per capita per annum, overall poverty headcount has remained unchanged, and the poverty gap which measures the severity of poverty and inequality, has escalated (DLA/DoA, 2005). The picture has become even worse today. Without a doubt, rural South Africa is becoming more and more desolate as more and more policies and strategies are put in place to achieve the direct opposite.

Migration of the black population, who make up the bulk of the rural dwellers, to the urban areas has consequently been growing as local people desperately search for an

escape route out of destitution. But this only worsens the overall condition of the black population since the saturated urban economy only leads to the urbanization of poverty, a phenomenon already identified in other countries by development practitioners (Ravallion, 2002; Ravallion and Chen, 2004). Conditions are not different for the white population either. According to recent observations, more and more white persons are falling into extreme poverty and meeting the requirements for social grants.

The foregoing trends are perhaps fueled by, among other things, the worsening rate of unemployment in the country already alluded to (see page 6). Additional points can be made to buttress the case. According to the UNDP Human Development Report for South Africa for 2003, the rate of unemployment could be anything from 25% to over 40% (UNDP, 2003). Many other organizations, including the government, maintain records of the unemployment growth and the consensus is that the situation is worsening. In 2005, this situation had led to a number of protests by the Labour Unions and minority political parties in the country. On Monday, 10 October, 2005, COSATU, which is the Trade Union Confederation that actually has an alliance with the ruling party, submitted a memorandum to the Presidency on the worsening crisis of joblessness in the country (Metro-FM Radio News, 2005). For several months in 2006, the local and international media were awash with news of a security workers' strike that sometimes became violent, with many lives being lost in the process. As recently as September, 2006, the Sunday Times (2006) reported IMF concerns about unemployment rates which were seen to still pose "major challenges". It would seem therefore that things have deteriorated so badly that political interests are subjugated in favour of the larger national interests.

At the same time, the perception has been growing of recent that land prices have been going up, at least since the end of 2002. This situation has been worrisome to the government and commentators alike. For a government that came to power on the promise of equalizing opportunities in the agricultural sector, this is clearly a subversion of its goals, if not an outright betrayal, and its desperation is understandable. If agricultural land is becoming high-priced in an environment where the incomes of the black population are not growing due to unrelenting unemployment and poverty, then the

goals defined under the land reform programme to fully democratize the agricultural sector and integrate the black population into the sector can hardly be achieved.

In 2004, a framework for the Black Economic Empowerment in the Agricultural Sector, AgriBEE, was launched as an expression of the desperation of government to speed up reforms within the sector. An initial focus of AgriBEE is to address the high prices of agricultural land which, according to the AgriBEE Framework document, is seen as the reason for the low number of black people entering the agricultural sector, among other concerns. The Framework document has further defined its goal as the attainment of "sustained profitable participation in the agricultural sector" for the black population (DoA, 2004). According to Professor Carl Eicher (2004), "the primary role of an agrarian restructuring in a… low income country is to put people to work".

Given the centrality of agricultural land prices in the successful implementation of the land reform process *per* se and in the various programmes and schemes that have been set up to make the process more effective and all-inclusive, it is important to understand the dynamics of land price determination in the South African agricultural sector. This is not only crucial in finding solutions to the current situation and ensuring that the government's objectives under the land reform programme are realized without negative consequences on the economy, it will also clarify the historical role of agricultural prices in the economy and the factors, both farm and non-farm, economic and non-economic, that determine its level and how these effects are mediated through the economy. An econometric analysis is needed to contribute to better understanding of the dynamic relationships and guide future actions on the land question in South Africa.

1.3 Objectives

The South African land market is very complex and it is necessary to carry out a broad review of the literature in order to gain adequate understanding of its many aspects and dimensions. For instance, it is expected that such issues as the land tax (still being debated, even at the most recent Land Summit held in Johannesburg in 2005), capital gains tax (now in force since 2001), the value of the local currency, product prices (to the

extent that they influence the net farm income), the broader reform process, especially the land reform programme, will assume some significance. How these issues influence farmland prices and might play a role in the future of South African agriculture are important given the overwhelming public interest. For that reason, these issues should be critically examined. Specifically, the thesis will aim to:

1. review the agricultural policy environment during both the apartheid and post-apartheid eras with special attention to the most recent ones such as the land reform programme in terms of its design and policy framework, implementation arrangements, pace, stakeholder perception, and potential for successful conclusion;
2. examine agricultural land prices in a historical context to determine the trends over time;
3. carry out econometric estimations of the agricultural land prices to understand the effects of a set of macroeconomic and other variables on agricultural land prices; and
4. make recommendations on the basis of the results, with attention on how to make current policies more effective in resolving outstanding concerns about the distribution of land in the country and the access of small and emerging farmers to this vital resource.

1.4 Motivation

Pricing is at the heart of economic development and the analysis of prices defines the full gamut of the professional pre-occupation of the development practitioner, policymaker, agricultural economist and all those whose lot it is to research, analyze, and implement development. The motivation for studying agricultural land prices in general and within the context of South Africa's changing policy environments concerning agricultural land in particular and the agricultural sector in general, can be divided into two broad strands. One is the socio-political aspect which also embraces elements of economic expediency. The other is related to the intellectual/academic rationale that looks at agricultural land

prices as an important indicator for policy making and research purposes. Each of these strands of thoughts will be presented in turn.

Looking at the socio-political aspects, it is already well-known that the issues surrounding land dominated the negotiations for the settlement of South Africa's political problem in the years preceding the first multi-party elections in the country in 1994. Since then, a comprehensive land reform programme has been established to address the various dimensions of the land question, namely land redistribution, land restitution, and tenure reform. Given South Africa's situation with respect to food self-sufficiency, there is no question that land can be redistributed without an adverse output effect. For instance, Van Zyl et al (1993) have shown that self-sufficiency indices for grain, horticultural crops, and livestock products stood at 150, 132, and 98, respectively, suggesting that even if redistribution of land leads to some output decline, there is no possibility of a food crisis as has been observed in Zimbabwe. One of the key targets set for the programme is to transfer 30% of land currently held by white farmers, to black ownership by 2014. More than 10 years into the programme, there are serious concerns that the pace is too slow to allow for the attainment of this target.

Questions have arisen as to whether or not the market-assisted format based on the willing-buyer-willing-seller model is working. To what extent is the target set for the programme, that is the transfer of 30% of the white-held land to black owners, responsible for the observations of rising agricultural land prices? The recent land summit provided a platform for articulating some of these worries towards the possibility of an increased role for government to speed up the process. The frequent question asked is whether the market left on its own can efficiently redistribute land, or any asset for that matter, in a way that specifically targets the poor, bearing in mind South Africa's history of discrimination which calls for some drastic effort at redress.

That some commentators and analysts have wondered if some government intervention is not called for possibly to cap the rising prices, which will constitute an odd mixture of market determination with government regulation of prices, only confirms the level of frustration that is quite diffuse. It is therefore important to investigate the dynamic role of

prices of agricultural land in the South African economy and the extent to which factors influencing the value of agricultural land are predictable and are amenable to policy intervention and manipulation.

In respect to the intellectual/academic value of agricultural land prices, there are four reasons why it is important to analyze agricultural land prices. In the first place, the cost of farmland is a major share of the overall cost of production in agriculture (Mishra, Moss and Erickson, 2004; Lence and Miller, 1999). This should of course differ from society to society according to the status of land, its relative abundance, and what alternative and competing uses make a demand on the available land. Van Schalkwyk (1995) has demonstrated this fact for the South African agricultural sector where, as is true for the United States of America and elsewhere (Schmitz, 1995; Schmitz and Moss, 1996), changes in agricultural land prices have a direct effect on farm wealth. Farms have been known to go into receiverships on account of the escalating prices of farmland which exert more than tolerable pressure on the bottom-line.

A second reason is the very close link between agricultural land prices and the solvency of the farm sector. In the United States, research has established that agricultural land prices constitute a large part of the farm assets. In some studies, notably those reported by Mishra, Moss and Erickson (2004), it is suggested that as much as 68% of agricultural assets for the average farm are accounted for by agricultural land prices. A third crucial reason for analyzing agricultural land prices is their use in the estimation of sector productivity and competitiveness. Finally, policy makers, in designing agricultural support programmes, find that farmland prices are the most convenient indicators of the sector's economic performance.

The policies that agricultural economists are called upon to evaluate are generally those that affect the pricing of commodities and factors and influence the way the economy as a whole is managed (Monke and Pearson, 1989). In terms of commodities and factors, agricultural economists are interested in prices of those produced and used domestically, produced and used elsewhere, or combinations of the above. As long as some effects are identifiable on the economy of interest and there is a chance that the welfare of the

citizens will be affected one way or the other, agricultural economists are interested in studying the prices. This is because commodity pricing is a veritable instrument for alleviating poverty and income re-distribution within an economy.

Policymakers use factor policies to address concerns over the effects of economic policy. An example of a factor policy is the Minimum wage legislation which alters the price of labour. If factor prices cause commodity systems to become unprofitable, government can intervene by providing subsidies to producers to encourage them to produce and be profitable. In the same way, if factor policies cause producers to earn excessive profits, government can reduce subsidies or impose taxes. It is possible to juggle around with policies so that specific non-efficiency objectives are achieved at minimum efficiency costs. When analysis reveals the outlook for social profits, policymakers are able to determine what changes in revenues (through yield increases) and costs can lead to improved profitability.

1.5 Research Methodology

The present study made use of a wide variety of methodologies and approaches to generate, transform, analyze, and interpret the data and information and present them in the form of a thesis. The issues surrounding land prices and land reform in South Africa have been well documented and are the subject of current and contemporary discussions and debates. For this reason, a large number of information sources have been utilized to generate the data and information. Many issues are still undergoing a process of evolution and constant change. For instance, policy developments on which much of the descriptive sections of the land reform programme are based are still on-going and many more changes are anticipated especially in the wake of the recommendations made at the Land Summit in Johannesburg in July 2005. Such possibilities have been taken into account in the descriptions provided in the thesis. For this component of the study, simple and straightforward analytical techniques have been used to describe this information and present them in ways that make them easily understandable.

As indicated earlier, the main interest is in providing a basis for predicting the nature of the dynamic relationship between agricultural land prices and the plethora of factors that play a crucial role in their determination. This entailed the use of modeling techniques suitable for analyzing time series data with a view to establishing any long-term, as well as short-term patterns that might explain the variations in land prices, particularly the most recent ones during the period of land reform and agrarian restructuring. In keeping with theory, co-integration procedures were applied to the data since their theoretical statistical properties of non-stationarity make them amenable to such analysis. This study made use of the residual-based approach and fitted an error correction model for the single equation situation, using the MicroFit and E-Views econometric packages for the most part.

A large number of possible explanatory variables was considered on the basis of the vast literature on the subject, recent policy developments, and the prior modeling carried out by Van Schalkwyk (1995). From that frame, 10 variables were selected and fitted. The question of multicollinearity was considered an important one in view of the large number of explanatory variables involved. To detect this problem and address it, successive estimations were carried out on the Microfit package and this automatically eliminated variables that measured the same phenomenon. The presence of multicollinearity in each case was indicated when the estimation returned the error message: “near singular matrix”. Another means of detecting multicollinearity was to apply the tolerance test procedure (Yu, 2007). While the tolerance the results of the long run estimation showed relatively low tolerance which were largely due to other reasons, the results of the ECM to produced reasonably high tolerance above the cut-off point of 0.1 to confirm the absence of any worrisome multicollinearity problem. The econometric procedures were carried out using the Microfit and E-Views packages.

1.6 Data Used

The study defined the dependent variable as the prices of South African agricultural land for which time series data for the period 1955 – 2003 were assembled. Existing time series for agricultural land prices and a set of macro aggregates such as agricultural

returns, inflation rates, exchange rates, real interest rates, and farm sizes, for the period 1955-1992 was the starting point for the study. The data had been generated from various sources, including the Deeds Registry, the Directorate of Agricultural Economics Trends, the Statistical Abstracts, the precursor of the present Statistics South Africa (SSA), and miscellaneous government publications. In order to extend the existing data to 2003, new data have had to be obtained from completed and on-going research in the Department of Agricultural Economics of the University of the Free State, records of the Reserve Bank of South Africa (RBSA), and a wide range of official statistical and economic publications. To express the data sets in constant 2000 prices, the Consumer Price Index (CPI) was used as deflator.

1.7 Outline of the Thesis

Following this first chapter that provided an overview of the study, highlighting the background and problem context, objectives and motivation for the study and a brief outline of the study methodology, the next chapter begins an extensive review of general land issues in terms of the policies, politics, and economics of land globally and in the South African context. Chapter 3 focuses on agricultural land prices and undertakes a review of relevant research conducted in different socio-economic and political contexts to assess agricultural land prices. The various methodologies and models used are reviewed in that chapter, as well as their conclusions and relevance to current thinking and conditions. The chapter also provides evidence from the literature on the motivation for studying agricultural land prices in the first place. Chapter 4 develops the model for the study and presents the specification of the model. In chapter 5, the statistical properties of the data, including the results of unit root tests, are presented. In addition, evidence of structural breaks in the data is presented with detailed discussion of the results of recursive analysis of the coefficients of the modeled variables. The results of the estimation of the farmland price model for South Africa are presented in Chapter 6. The summary and recommendations of the thesis are presented in Chapter 7.

CHAPTER 2
A REVIEW OF LAND ISSUES, POLITICS AND POLICIES

2.1 Introduction

Since the pricing of land over time is the subject-matter of this thesis, it will be useful if some light is thrown at the outset on what questions have surrounded land over time. This chapter begins the more formal review of the relevant literature on the central theme of the thesis which revolves around the land question in South Africa. However, the review recognizes that the South African land question cannot be viewed in isolation since it is inconceivable that a phenomenon of such enormity could have failed to draw from broader global experiences and lessons. Even if the South African experience ultimately turns out to be unique, there is intellectual value in having a framework for comparison and for pronouncing one way or the other. Furthermore, the need for this thesis to make some contribution to the on-going debate on various aspects of land in the country imposes the obligation to present a balanced discussion.

In view of the foregoing, this chapter will examine the economics and politics of land and how it has evolved as a formidable tool not only for economic development planning but also for political management and organization of society. Several instances are known worldwide where land has either created the motivation for political action of one type or the other, or has become an important outcome of such actions. The extent to which such experiences are systematic obviously has relevance for policy. For this reason, the different roles that land can and do play, within a multifunctional conception of agriculture, are reviewed. Attention will then be turned to the way and manner land entered the politics of South Africa and how this has governed and mediated political, social and economic life in the country ever since. Within this framework, the legislative developments that have charted the course of land ownership and distribution in the country are reviewed. Early remedial efforts, even during the heydays of apartheid dominance, will also be highlighted as precursors for the new legislations and policies

that are now trying to achieve redress and right the wrongs of the past. In this regard, such issues as the series of debates on a possible land tax in the country and the taxing of capital gains will be touched upon.

2.2 Land, Economics and Politics

As indicated, this review will comprehensively examine the land question in a broad socio-political and economic context. The global experience will be discussed before attention is directed to the South African experience to examine what role land has played in the economic history of the country as well as how it has featured in the process of agricultural development of the country. This will be useful in order to properly situate the whole issue of land price formation and the interaction between agricultural restructuring the value of agricultural lands. The international literature on land in general, and agricultural land in particular, has devoted ample space to the role of land in the development process and how policies about its distribution and use have influenced some of the most interesting political developments in history.

There is a lot of interest in the role of land as a factor of production and what determines access to land for agricultural and other purposes as well as the process by which prices are formed in the agricultural land market. There is equally a rich literature on the land market in general but for purposes of the present study, the review will be limited to the agricultural land markets and how they function. Although relevant research will consist mainly of studies accomplished within related geographical settings, there is value in establishing theoretical and methodological patterns, irrespective of where such work is done.

To that extent, this section examines previous research that has dwelt on the subject of land in general and its unique role in agricultural production, and land prices more specifically. The factors that determine the levels of agricultural lands being the central theme of this study, the review will specifically seek to provide what explanation has been provided by previous research. Given the vastness of the literature, only a portion of the available evidence can be productively reviewed. For this reason, the review is

limited to questions of the methodology employed by the previous work, what conclusions have been drawn in respect to the basic research question, and what policy outcomes have resulted from such works.

An important focus of this literature review will be models which have been used to attempt explanations of the phenomenon of agricultural land price movements. These will be presented within the broad framework of the two schools of thought on agricultural farm land pricing previously alluded to in this chapter. But to again situate the discussion within its historical antecedents, the South African experience with land, its distribution, use and pricing, will be presented as a point of departure for the more specific focus on the farmland price determination in the country against the background of the land reform programme that is currently on-going.

2.2.1 Land in Agricultural Production

According to the US Department of Agriculture, agricultural production is a major use of land (USDA, 2005). This conclusion is true as much for agrarian societies as for modern industrial societies possibly because of the resource intensity of agriculture as a sector with respect to land, regardless of the technology in use and the scale of the enterprise. For instance, even where agricultural production is organized at the subsistence scale by resource-poor households, it is almost always the case that the land devoted to farming and farm-related activities is more than what can be devoted to other uses, including human habitation. It is estimated that agricultural production accounts for more than 46% of the total land area of the United States (ERS/USDA, 2005), while for a country like Ethiopia, the agricultural area accounts for over 60% of the total land area (Mengistu, 2005). The proportion of a country's land area that is devoted to agricultural production may actually relate to other than the level of technological development of the agricultural sector, which defines factor intensity, and may in fact be due to the relative importance of agriculture in the national economy.

The concept of "agricultural multifunctionality" is one that has been gaining prominence since the Rio Earth Summit in 1992 (DeVries, 2000; Boody *et al*., 2005). According to

this concept, agriculture serves multiple functions in society beyond its traditional role as the source of food and fibre (WCED, 1987; UNCED, 1992*)*. These functions have been described as "positive goods" which include "rural community values such as a large number of independent family farms, strong local economies that both rely on the economic output of local farms and supply them with agricultural goods and services, rural employment, and the continued health of rural culture" (DeVries, 2000). It is obvious that if land is the pivot of conventional agricultural practices, then a multifunctional agriculture implies that land is a versatile resource whose influences are numerous and diffuse.

In the context of Agenda 21's focus on food security and sustainable development (UNCED, 1992), it would seem that the view of the vital role of land in poverty reduction strategies is unquestionable. This somehow gives weight to the RDP definition of land as the "basic need" of the people of South Africa (ANC, 1994). Given the serious poverty problems in the rural areas, especially the black areas of the country, this conception of land assumes greater palpability. A quotation attributed to a Filipino peasant captures the essence in the following:

> *"for us the land is our life; we would defend it to the last drop of our blood"* (Dudley, Madeley and Stolton, 1992).

2.2.2 Land in South African Economy and Politics

In a very fundamental sense, South Africa's history has been more about land than much else. Although much of the recent discussion on the land question trace the discriminatory policies to the Land Act of 1913, the events that built up to it date back several centuries to the arrival on the South African shores of Jan van Riebeeck. This section will briefly lay out the historical details as they relate to land and how South African land policies have evolved since then.

2.2.2.1 From the Conquest to 1913

The arrival on 6 April 1652 of the Dutch East Indian Company led by the legendary Jan van Riebeeck marked the beginning of the land problems in South Africa (DBSA, 2005; Plaatjie, 2005). Purportedly enroute to more distant lands in East Asia, the group made what was reported as a temporary stopover but found the conditions conducive to farming activities and in 1654 the first piece of land was obtained for farming purposes. Accounts vary as to the initial reaction to the use of land by the Dutch. By one account, the Dutch settlers had met an indigenous population whose primary economic activity was trading in merchandise brought in by the seafarers (Van Schalkwyk, 1995). There may have been some black indifference to the acquisition of land which they did not need anyway. But according to Plaatjie (2005), the indigenous black population was already actively farming on the land long before 1652 and there were clear links between man and the land as a productive resource.

Whatever the initial reaction, Wilson & Thompson (1969) recorded in their historical account of those early days the development of serious tensions between the settlers and the indigenous population. There was a clear sense of unease at the rate at which land was being grabbed by the settlers. The first recorded violent conflict over land may have occurred in 1659 when the indigenous population made a serious attempt to chase the settlers out of their land. This effort proved unsuccessful (Wilson & Thompson, 1969).

Basking in their successful subjugation of the black uprising, the settlers began to make incursions inland. From the coast, the conquerors radiated northwards and eastwards, capturing land in areas of present day Kimberley and the Orange Free State. In the course of the 19th century, it was no longer in doubt that white presence on the land was a permanent feature of the South African agricultural scene. Gill (1993) described some of the conflicts over land that spread into the heartland of the present Free State Province and commonly known as the *Lifaqane* wars fought during 1818 – 1824.

Alongside the aggrandizing land conquests came another major development with implications for black agricultural participation. This was the discovery of diamonds and

gold in several parts of South Africa where mines were springing up to exploit these resources. With more discovery and exploitation of these resources, the mining interests were consolidating and gaining more economic power which attracted more international investment that facilitated improvements in the conditions at the mines. Expectedly, mine employment became more attractive. It was also at this time that the Land Banks were established, from 1907, to concentrate more land in the hands of the white settlers (Murray, 1997). This latter development gradually stripped the African peasant farmers of their productive resources, turning them into wage earners on white-run large farms or in the mines (Keegan, 1986; Jeeves and Crush, 1997; Murray, 1997).

With more settled and commercial-oriented agriculture and opening of the mines, wage employment in both agriculture and mining became important and the period witnessed a sharp decline in the incidence of raids and inter-group conflicts for which men were expected to play important defensive/combative roles for their communities. With considerable spare time at their disposal, the men were naturally attracted to the emerging opportunities for short-term contractual employment in the construction of rail-roads and in the diamond and gold mines springing up in South Africa. Kimble (1979), Swallow and Borris (1988), and Gill (1994) have advanced similar reasons for the decline in agricultural productivity in neighbouring Lesotho following the boom years as the nineteenth century drew to a close. Similar spillover effects may have been inevitable in the other countries that share borders with the country given the dominant influence South Africa has always had in the region.

There is evidence that the increasing agricultural activities brought with them unexpected affluence among the Dutch settlers and, along with this development, increasing envy of the others both within and without who were beginning to develop some interest in what was going on in the territory. The most outstanding such new entrants were the English who apparently saw themselves being marginalized by the new economic prosperity. According to Plaatjie (2005), the war that is variously described as the South African War and the Anglo-Boer War fought over the period 1899-1902 was about land and brought devastating consequences on the territory's agricultural economy.

The phenomenon of the "poor white man" is no doubt one of the clearest manifestations of the extreme hardship that was unleashed on the immigrant Dutch farmers, or Afrikaaners, whose agricultural economies were virtually wiped out (Plaatjie, 2005). The English had by this time destroyed every Afrikaner farm they could not take and created so much misery among the Afrikaner population that they became virtually the most destitute people within the territory that later became the Union of South Africa. It was clear that the war had indeed given rise to a fundamental restructuring of the agricultural sector in terms of the ownership and control of land and the racial structure of economic power in ways that would reverberate into the next century and possibly to the present day. Murray (1997) has contributed a very graphic description of the role of Lord Alfred Milner, drawing amply from Marks and Trapido (1979), in attempting to "break the back of (any) lingering spirit of Boer rebelliousness by sprinkling the countryside with English-speaking yeoman farmers".

During this period, the practice of allocating city areas on racial lines began to take hold. Kassier and Groenewald (1990), cited by Van Schalkwyk (1995), recall the discriminatory practice of allocating land to the immigrants from Europe in a manner that ignored the existence of the black population. The phenomenon of the "black reserves" emerged at this time as well, representing geographical areas demarcated for the exclusive residence of the black population. Within these reserves, land tenure arrangements followed a different pattern from what prevailed in the white areas, with more traditional communal systems of ownership being kept in place.

The black population was forbidden to seek or use land outside those reserves. In the Orange Free State, at least, a formal legal system had been established, codified in the Orange Free State Law Book (1891) barring the indigenous black population from owning or leasing land outside the black reserves (Davenport and Hunt, 1974). Of course, this was not uniformly applied in the rest of the country, with some provinces allowing limited black access to land as a 1905 Supreme Court interpretation of the Pretoria Convention of 1881 revealed (Davenport and Hunt, 1974). The rest of the territory was designated "white area" (Meredith, 1988) unless otherwise reserved as "state land". The state land could be allocated to either blacks or whites but the blacks were obliged to

conduct themselves in a manner approved by the state in order to retain their allocation (Meredith, 1988).

By this time, the conflictual environment had stabilized sufficiently for a system of land trading to evolve. According to Kassier and Groenewald (1990), land in the Natal area was being traded on the London Stock Exchange by 1860 when some 15 speculators had acquired about 275,000 ha of land in the area. With the growth of a land market, the need to farm profitably was becoming quite urgent. Some of the factors that motivated the black population to seek wage employment as peace returned to this volatile area have been mentioned earlier in this chapter. To these, Groosskopf (1932) adds the growing poverty among a black population that had lost its land to the whites and now had to live in overcrowded black areas where even the raising of animals was hampered by overgrazing and thefts.

There are numerous accounts of how the African peasantry held up in spite of the embattlement it faced in the hands of racism and deliberate attempts to stifle it. Evidence has been found to support the claim that a prosperous black farming class was able to exploit the burgeoning consumer markets in Johannesburg and Kimberley where mining incomes was creating wealth and effective demand beyond their wildest imagination. The mine workers and urban entrepreneurs in the newly formed towns and cities needed to be fed, and the story is that the food came, not only from the white but also the black farms (Plaatjie, 2005). This was the situation up to the formation of the Union of South Africa in 1910 and unified system of governance came into existence with administrative headquarters in Pretoria.

With the new administration stationed in Pretoria, a new emphasis was placed on centralization of policies on property rights. The in-coming government under Lord Alfred Milner took the first definitive step in this direction by setting up the South African Native Affairs Commission to spearhead the process of centralization of land policy for the whole country (Jeeves and Crush, 1997; Murray, 1997). This commission was named the Lagden Commission after its first chairman. According to Van Schalkwyk (1995), this commission became the architect of some of the most repressive legislations

which enthroned white economic interests to the detriment of those of the black population. As noted by Kassier and Groenewald (1990), this era defined the eventual structure and character of South African agriculture. As the era drew to a close, the profusion of legislations that would result in a record 87 bills over a quarter of a century began with two of the most influential and historically significant ones, namely the 1912 Land and Agricultural Bank Act and the infamous Land Act of 1913.

As was noted earlier, the establishment of Land banks began in 1907 as institutions to assist the white (largely English) farmers who were rapidly acquiring agricultural land in the wake of the subjugation of both the black and Afrikaner populations. Following the formation of the Union of South Africa in 1910, the next move was to bring all these colonial land banks under one administration. The Land and Agricultural Bank Act of 1912 was the instrument for achieving this. Its distinguishing feature was its exclusive white focus, targeting only the white farmers and related bodies that supported white agriculture.

In 1913, the series of discriminatory actions regarding ownership and distribution of land was finally given a legislative stamp. This was done by the enactment of the Natives Land Act in 1913. This is easily one of the most discussed Acts in the literature on the South African land policies. According to Davenport and Hunt (1974), The World Bank (1993 and 2003), the African National Congress (1994), Van Schalkwyk (1995), Lyne and Darroch (2003), and others, it was this single piece of legislation that effectively restricted black ownership of land to the areas designated as the Native "Reserves". A black person could not purchase, lease or rent land outside this area unless approval was given by the Governor-General (of State President) of the Union of South Africa.

The Native Reserves were later formally designated the "homelands" about which some of the most intriguing political and governance arrangements were also made that allowed some measure of self-government. According to the National Department of Agriculture's (NDA) documentation, the land area involved was about 17 million hectares which was approximately 13.9% of the national land area (Fenyes & Meyer, 2003). Without a doubt, this was a completely different setting in terms of the

relationships between man and the land and the kinds of arrangements that were necessary to access this resource for use in any way. While the principal mode of tenure remained customary and involved the traditional power élite exercising complete control over the land and individuals having only usufructuary rights (Lyne and Darroch, 2003), there was less land available for the generality of the people, resulting in widespread landlessness within the "homelands".

2.2.2.2 Post 1913 Laws and the Consolidation of White Power on Land

The next 35 years, up to 1948, saw the consolidation of white power on land and the intensification of the discriminatory rules that progressively dispossessed the black population and impoverished them beyond anything imaginable. A combination of stiff legislations and other measures were employed to achieve the aim of developing white agriculture into a powerful ally for systematic discrimination. At the same time, this was an era marked by continuing political rivalry within the white race that revealed its heterogenous character. As has been mentioned earlier, the English and the Dutch settlers (or Afrikaners) has been major adversaries over the land for the better part of a century. Defeat for the Afrikaners meant extreme pauperization which deepened their bitterness and provided the strongest motivation for political participation to influence legislation in favour of the Afrikaners.

In 1922, the Union government enacted the Cooperative Societies Act of 1922 to create an elaborate network of agricultural cooperative system to support white farming. This system aimed to capacitate white farmers through ensuring the prompt delivery of information about techniques and markets. Working side by side with the newly reconstituted Land Bank that delivered soft loans, the cooperative system was instrumental to the strengthening of a competitive advantage enjoyed exclusively by white agriculture that as a consequence faced much lower transactions cost than the black farming system.

In the meantime, the profusion of land-related legislations continued. In 1936, the Native Trust and Land Act of 1936 was enacted to endow the Governor-General with more

powers over the land tenure arrangements within the black reserves (Van Schalkwyk, 1995). This was clearly overkill in a situation where the black population had been consigned into the reserves and was still not free to manage their use of the land. The next year, the Marketing Act of 1937 was enacted to provide support to the white commercial farmers in the marketing of their produce. The aim was to give more certainty to the white farmers as the farmers had assurance of marketing a good part of what they produced and therefore had strong motivation to expand production as much as possible.

Given the massive help in subsidies that was coming from the reconstituted Agricultural and Land Bank, this was in no way a tall order for the white farmers. As would be expected, the benefits of the Marketing Act of 1937 completely by-passed the black farmers in the reserves. Mention needs also be made of the measures that aimed to improve soil quality and further enhance the production environment for white agriculture. Notable among this is the Soil Conservation Act of 1946 which aimed to conserve the soil quality in the white areas.

2.2.2.3 The Apartheid Era and Land Laws

The National Party controlled by the Afrikaner population came to power in 1948. This review will be limited to laws enacted during this era that had implications for land ownership and control and leave out those that were more of a political nature except where these cannot be separated. The Groups Areas Act of 1956 is perhaps the signature legislation of the new regime which had come to power on the ticket to redress wrongs done to the Afrikaner population by the English. The Act divided the country along race lines. Nobody was allowed to own property outside his/her own colour-based area. If there was any hope of somehow circumventing the Land Act of 1913 by acquiring land elsewhere from your place of residence, the Group Areas Act effectively put an end to that dream.

The literature provides other strong indications of stiff resistance on the part of the new regime to improve conditions for the black population even in the face of evidence that

such improvements were called for. For instance, Government documents reviewed by Van Schalkwyk (1995) suggest that despite recommendations by the Tomlinson Commission of 1955 for improvement of economic and agricultural conditions in the black areas, the government was adamant and rejected these outright. Of particular interest was the recommendation to introduce freehold tenure in the homelands, and drop the idea of one-man-one-plot which limited the scope for the black farmer to expand his holding and improve productivity and output.

Ultimately, the legacy of the era of the Apartheid government as far as agricultural development was concerned was the widening of the gap between the white and black populations. As more and more favourable support programmes were channeled towards the white farmers, less and less went to the black farmers within the reserves, resulting in a widening of the gulf between them and the deepening of black poverty and backwardness. The support packages channeled to the white farmers included access to research findings and the most elaborate and sophisticated systems of agricultural extension education and training, including through the instrumentality of the cooperative system already set up by the British administration.

2.2.2.4 The Era of Deregulation and Limited Black Empowerment

As the apartheid stranglehold tightened around the black farming population there were signs of resilience and determination to make farming pay within the black homelands. Bayley (2000) draws attention to the struggle among the black farmers to produce some food for subsistence purposes as more Acts were enacted that reinforced their marginalization. Especial mention is made of the 1968 Marketing Act which, while coming up with some new measures to improve the marketing system, still provided for treating different geographical areas differently. There was still a high level of state support to the cooperative sector alongside the emphasis on confining African farming activities to specified geographical areas. For all practical purposes, the Marketing Act was established in the context of systematic disempowerment of black farmers. Most agricultural households in the reserves/homeland areas were reliant on off-farm incomes and food purchases to supplement their own production. Market interventions designed to

benefit white farmers were sometimes implemented in a way that negatively affected net sellers in homeland areas.

However, in the early 1980s, a stark reality was beginning to dawn on the policymakers in South Africa. This review has highlighted the considerable amount of state subsidy that went into the agricultural sector over the years (Van Schalkwyk, 1995). It would have been too much to expect that these support measures, in the way they were structured and delivered, would have no macro-economic and environmental consequences. For one thing, along with the subsidies, the farmers faced state-established producer prices that far exceeded world prices for the commodities such as maize (Van Schalkwyk, 1995). The farmers were also being provided technical support and information about latest research findings on mechanical and biological technology which meant that they could continue to make profits as they expanded hectarage.

And this they did as a rational economic behaviour. Brand et al. (1992) noted that large stretches of land came under maize as farmers strove for more and more profits. The upshot naturally was the South African agricultural sector, while generating some of the highest surpluses on the continent, became increasingly environmentally and economically unsustainable. Van Zyl (1989) concluded that for that period, the substantial surpluses being generated did not benefit the country in any meaningful way but rather resulted in a welfare loss for the country as a whole.

Given this realization, it was inevitable that some rationalization would be put in place. Van Schalkwyk (1995) shows that the deregulation of the agricultural sector was actually part of an economy-wide financial sector liberalization that began in the early 1980s to mitigate the macroeconomic effects of the past agricultural support policies. It must be borne in mind that this era also witnessed the intensification of the global condemnation of the repressive regime in South Africa which was being expressed in stifling economic sanctions and almost complete curtailment of contacts with the regime. Without a doubt, therefore, the forces that led to the South African government to consider agricultural restructuring were multiple, coming from both their own policy actions and the impact of the global fight against Apartheid.

Along with the financial and economic reforms, the government obviously saw that the Apartheid system was unsustainable and that sooner rather than later, there would be accounting to do. From the mid-1980s, a number of locations within the former homelands were identified for agricultural development. The aim was to establish a core of black farmers who would "emerge" into commercial agriculture. Qwaqwa was one of the former homeland areas identified for agricultural development by the previous government (Jordaan and Jooste, 2004). The idea was to select a set of former employees of the government agricultural support parastatal known as Agriqwa and settle them on land expropriated from white commercial farmers. According to Jordaan and Jooste (2004), approximately 55000ha of land were expropriated between 1979 and 1986, divided up and equipped with the necessary infrastructure for modern and sustainable farming. Farm sizes vary from 250ha to 1000ha depending on the potential and type of farm.

Another systematic study of the changing policy environment at this time was conducted by Claasen (2000) to analyze the situation of the group of 114 black farmers who participated in the land settlement scheme in the former black "homeland" of Qwaqwa in 1989. These 114 farmers were mostly selected from Agriqwa, a non-profit government corporation, which was founded for the sole aim of establishing these "emerging" or "beginning" farmers. The agency provided financial and technical assistance to the newly settled farmers each of which had been allocated between 350 and 450 ha of farmland. Infrastructure for improved modern farming was also installed and farmers received frequent advisory visits from officials who provided them with every assistance needed to turn farming into a profitable endeavour. Value adding activities seemed to be popular and profitable among emerging farmers. This experiment seemed to debunk the notion of the black farmer as not being responsive to economic incentives and was actually so steeped in tradition that he would be unable to be weaned from a subsistence mode of production. It was clear that these emerging farmers possessed the will and ingenuity to make a success of agriculture in the area (Claasen, 2000).

Similar schemes were initiated in the other former black areas of the country. A review of the post-1994 agricultural development revealed the phenomenal and innovative actions

taken in the North West Province to irrigate communal arable lands that were managed under a mixture of tribal tenure systems and freehold with a highly sophisticated irrigation infrastructure. Golder Associates (2004) has completed an assessment of the scheme undertaken during that era and produced a comprehensive document that provides insights into the scheme in terms of its objectives, scope, operational details and problems especially with the inception of pluralistic democratic dispensation and the integration of the former "homelands" into the rest of South Africa.

According to Golder Associates (2004), the irrigation scheme was established on land that existed under communal tenure arrangements where user rights were allocated by the tribal leadership on a hereditary basis. No payments were made for the acquisition of user rights to land. The development within the Taung area of the province possesses characteristics that are considered typical of what prevailed in the erstwhile Bophutswana Republic, as this former "homeland" was known. The particular scheme analyzed comprises 4000-5000ha of communal arable land which has been partitioned among 411 farmers who, as explained earlier, do not have to pay anything for the user rights in keeping with the precepts of the communal tenure systems prevailing in the traditional black areas of the country.

When the scheme took off in the period 1980-1989, candidate farmers were selected from the rural communities by tribal/communal leaders in cooperation with the public agencies created for agricultural development within this self-governing homeland. When the scheme began, participating farmers were each allocated 1.7 ha of land within a circular piece of land described as a "circle" which was served by a rotary irrigation infrastructure or "pivot" that consisted of pipe-fed irrigating "machinery" on wheels that delivers water on participating fields according to a predetermined format. Today this scheme has been expanded and each participating farmer is allocated 10 ha of land within the circle on which three other farmers (making 4 farmers in all) own same-sized parcels and sharing one pivot for irrigating their fields. An additional area comprising 1000-1500 ha arable land is now being cultivated with sprinkler irrigation (Golder Associates, 2004).

Contemporary discourse on the land question within South Africa's troubled past has largely ignored this limited, even if half-hearted attempt to empower the black population and integrate them into the nation's agricultural economy. Not many commentaries have seen this effort in charitable terms. Some commentators have actually gone as far as suggesting that the Apartheid regime, realizing that the day of reckoning was in the horizon, needed to have in place arrangements that would not be lost on the historians of the Apartheid era.

Whatever the intention of the Apartheid government was in establishing the agricultural development programmes in the former homelands at this time, the fact remains that it happened. And its significance and practical implications are even further heightened by what has happened to the schemes with the advent of democratic rule. In his study, Claasen (2000) tracked the progress of the Qwaqwa scheme up to the post-Apartheid era and has made a number of interesting revelations. For instance, it was found that after 1994, official policies regarding the previous homelands changed dramatically. The support agency Agriqwa was dissolved and replaced by another one named Agri-Eco.

It was not long before the restructuring and rationalization of Agri-Eco implied the end of financial and agricultural assistance to the emerging farmers in Qwaqwa (Claasen, 2000). As a result of this process of restructuring, the emerging farmers now have to compete independently in a free market environment. These emerging farmers have suddenly been exposed to a competitive market environment without having much experience or preparation for it. The result has been very serious managerial problems for these farmers. The study also found that a number of farmers are experiencing serious financial problems. The refusal of commercial banks and agricultural cooperatives to grant production loans for planting purposes, underlines the extent of the financial difficulties experienced by emerging farmers in the area. A major conclusion of the study is that the success of similar projects is largely dependent on basic support structures in training and agricultural extension work from government and development agencies.

Without question, Government needed to embark on location- and commodity-specific programmes (infrastructure and training) designed to increase the capacity of black

farmers to compete meaningfully in a deregulated market. More importantly, government should devote efforts towards facilitating:

- competition along the marketing chains
- the provision of agricultural information
- a legally secure framework within which agricultural trade can take place
- the maintenance of the physical marketing infrastructure.

2.2.2.5 The Era of Land Reform and Agricultural Restructuring

Without an iota of doubt, realism had begun to dawn on the Apartheid regime in South Africa regarding the role the black population could play in the country's agriculture. Even before democratic pluralism was ushered in, discussion has started on what the nature of the rural restructuring would be (Van Zyl and Van Schalkwyk, 1993; Williams, 1993; World Bank, 1993). According to Van Zyl and Binswanger (1995), the system of racial discrimination was clearly unsustainable and was hurting the economy in very fundamental respects. For one thing, the exclusion of a large segment of the population from meaningful economic participation was preventing the emergence of entrepreneurship in the small scale sector and within the rural economy. The development of such entrepreneurship would go a long way in addressing employment creation and stimulation of the rural economy. In the views of Van Zyl and Binswanger (1995), the political consequences would be quite catastrophic if not addressed decisively and with the minimum delay. An urgent need to restructure the agricultural sector and embark on a redistribution of land was identified and seen as the way to avoid an imminent and "debilitating pattern of civil disorder and violence…" (Binswanger and Deininger, 1993).

The literature has extensively reported on the various twists and turns in policies and strategies affecting the agricultural sector during the Apartheid era (Van Schalkwyk *et al.*, 2003) and changes that have taken place since the new regime in South Africa assumed political power in 1994. Nothing better describes these changes more than Summers and Vinod's (1993) assertion that "communism is the longest route from

capitalism to capitalism. As has been highlighted earlier, the move towards freeing up the sector pre-dated democratic elections given the realization that the excessive regulation and paternalism was costing the economy dearly. According to the World Bank (1994) and IMF (2000), economic growth grew generally at around 1% per annum towards the end of Apartheid rule. Between 1986 and 1992, GDP growth rate averaged 1.03% while employment grew at -0.23% (The World Bank, 1994). Since then, economic growth has averaged above 3% per annum. While questions remain about what the ultimate lessons of the land reform programme would be (Hart, 2003), there are indications from a number of macroeconomic indices that conditions have been changing for the better over the years. For instance, in the second quarter of 2005, the annualized rate of real growth stood at 5% (South African Reserve Bank, 2005).

Bayley (2000) catalogued a number of the most obvious reasons for the deregulation of the agricultural market of South Africa, including broader macro-economic reforms, especially the financial sector reforms that took place in the 1970s, featuring the real depreciation of the Rand in the 1980s and interest rates adjustments. In addition to these factors, Bayley (2000) also highlighted the following developments:

- realization by the practitioners themselves, including farming and industry leaders, that the control system was not sustainable;
- dissatisfaction with the operations of the marketing boards which were expressed in a number of legal challenges;
- despite food self-sufficiency being achieved, the agricultural sector was performing very poorly in terms of its contribution to national wealth (GDP) and employment growth;
- rising domestic food prices in the 1960s which pointed to the need for market liberalization.

The marketing control structure was also seen as mechanisms for the reinforcement of the marginalization of the black farming population, providing high level of state support to the cooperative sector, promoting a monopolistic paradigm, and using statutory support

to encourage the inflation of land prices (Bayley, 2000). There was also a feeling that the government used marketing controls as a vehicle for rent seeking (Bayley, 2000).

The first hint towards liberalizing the agricultural market was the enactment of the 1968 Marketing Act (Bayley, 2000). But critics claim that the associated reforms had very little teeth and could be easily reversed. Critics also had various problems with the management of these early reform measures which were tagged *ad hoc* (Bayley, 2000). In the opinion of several commentators (Van Schalkwyk, Groenewald, and Jooste, 2003), much of the amendments made to the earlier control Acts were merely intended to close existing loopholes in the control apparatus and tighten government's grip even more. Producer prices of farm products began increasing quite uncontrollably largely because input costs were also going up quite fast. According to FAO data, rate of price increases in South Africa far exceeded what was observed in many other developing countries of comparable levels of development (Van Schalkwyk, Groenewald and Jooste, 2003). In the face of the deteriorating price situation, many researchers, notably Louw (1979), and Groenewald (1979 and 1980), as cited by Van Schalkwyk, Groenewald and Jooste (2003), warned of an impending financial disaster in the agricultural sector. By the mid-1980s, the doom-day was already upon agriculture, as several farmers began to experience far-reaching financial setbacks and insolvencies (Van Schalkwyk, Groenewald and Jooste, 2003).

The deregulation of the agricultural market came only with the establishment of pluralistic democracy in the country. In the 1996, The Marketing of Agricultural Products Act of 1996 was passed. The purpose of the new Marketing Act relates to its four central objectives:

a) increasing market access for all South African producers who use the marketing system;
b) enhancing marketing efficiency for agricultural produce;
c) ensuring that export earnings arising from the agricultural sector are optimized; and
d) providing a basis for making agriculture more viable.

There was a clear departure from the excessive controls of the past and the a clear commitment to use agriculture as a vehicle for broad-based development of the country and alleviating poverty for the generality of the population, especially the black South Africans who had been excluded from the mainstream of the country's agricultural economy over a long time. The literature makes clear distinctions between the old regime of controls and the new marketing policies which have been presented by Van Schalkwyk, Groenewald and Jooste (2003) in tabular form as follows:

Table 2.1: Distinctions between the Marketing Act of 1968 and the Marketing of Agricultural Products Act of 1996

1968 Interventionist system	**1996** Market Deregulation
Increased productivity	Increased marketing efficiency
Reduction of marketing margins	Optimum export earnings
Increased consumption and food self-sufficiency	Food security at household level
Maximum commercial producers on land	More emphasis on small-scale farmers
Economic farming units; minimum farm size	Increased sustainability of agriculture
Non-participative and bureaucratic introduction of intervention	Participative, transparent and all-inclusive
Stabilizing product prices	Producers must themselves stabilize income
Intervention inclusive of single channel; pools, surplus removal, fixed prices, quotas; price support; promotion; general and special levies, registration, records and returns.	Limited to levies; export control; pools; registration; records and returns.
Requested by producers or introduced by Minister	Requested by any directly affected group of persons or firms
Consultation not always necessary although certain quantified producer support required	Consultation process prescribed by Act inclusive of all directly affected groups
No political process to approve levies apart from Minister	Levies need to be approved by both parliamentary portfolio committees and the Minister
No maximum period and no interim testing of intervention.	All statutory measures to be introduced for fixed period and tested at least every two years.

Source: Van Schalkwyk, Groenewald and Jooste (2003).

From the standpoint of modeling an asset or commodity markets, the significance of deregulation of the agricultural sector rests largely in the new institutions that arise from such a policy development and influence the length of the marketing channel one way or

the other, and invariably affect marketing as well as other transactions costs. Ruijis (2002) has examined these outcomes in respect of cereals marketing in West Africa. But a common theoretical thread can be found within the broad field of institutional economics (North, 1989 and 1991; North and Wallis, 1994; and Eicher, 1999, among others).

The fact that this element is often taken as given provides strong justification to examine it explicitly at this point. The academic and development literature is replete with the substantial contribution that asset ownership and its equitable distribution make for economic growth. Such thinking is not new any longer with respect to asset ownership but did have a long-running battle with the strong and contrary views of earlier growth models such as those of Kaldor and Kuznets. It has now been established on the basis of international experience that permanently higher levels of growth can be achieved if the productive assets of the society, principally land for an agrarian society, are redistributed in a way that is just and equitable. Aghion et al. (1999), Bardhan et al. (1999), and Piketty (1999), are some of the development literature that have clearly demonstrated this in a range of developing countries as part of efforts to develop new theories of growth. This thinking is also consistent with the standard position that secure property rights contribute to productivity growth through inducing those who enjoy such rights to exert more labour and management effort and deploy higher levels of investment to enhance the fertility of their land (Feder and Feeny, 1991). The role of land reform in economic development has generally been examined against this background (De Janvry, 1984; Cusworth, 1992; Delgado, 1995; Christiansen, 1996; Deininger, undated; Greenberg, 2002; and others).

There are more empirical studies, including those undertaken by the World Bank, which provide cross-country evidence on this matter, the most notable being Deininger and Squire (1998), Deininger and Olinto (1999), World Bank (2001). Using cross-country regressions, these studies have demonstrated that when the distribution of land ownership is unequal, economic growth proceeds at a much slower pace, if at all. A comparison of agricultural growth rates in China and South Africa over the period 1980 – 1993 illustrates this point more sharply. While Chinese agriculture based on a smallholder model operated on small farms of less than 2 ha on average generated a rate of growth of

5.3% p.a. during that period, South Africa's agriculture based mainly on 60,000 commercial farmers who controlled 102 million ha of land, grew at 1.8% over the same period (Eicher and Rukuni, 1996). What this poor growth performance meant for rural living condition in South Africa is an all too familiar picture. This can be contrasted with the very significant contributions that a more equal distribution of land seemed to have made on human development indicators in China, consistent with positive economic performance described earlier (Burgess, 1998; Deininger, Van den Brink, and Moyo, 2000).

Household level effects have also been shown to be quite important. A large amount of studies have also established the important positive impact of a more equal distribution of land on household level welfare and food security, among other favourable outcomes (Hoff, 1996; Blanchflower and Oswald, 1998; Deininger *et al*., 2000). In India, it was shown that land reform positively impacted on the poverty situation in the country and that, at least in one State of the country, namely the West Bengal, productivity increases resulted from reforms in the tenancy arrangements (Besley and Burgess, 1998; Banerjee, 1998). Despite very strong criticisms by several organized groups, it has been shown that the reforms in the Philippines have produced some significant changes in the investment patterns of beneficiaries of land reform who were shown to devote more resources to the education of their children than households not affected by land reforms (Deininger et al. 1999). Similar results have also been obtained from Brazil where as much as a 5-fold increase in the income of beneficiaries of land reforms was observed (Buinainain et al. 1999). How the beneficiaries of land reform are selected remains an important aspects of a land reform programme (Van Rooyen and Njobe-Mbuli, 1996).

As has been noted earlier, intensive discussions among several stakeholders preceded the launch of the Land Reform Programme in South Africa. In its own contribution, the World Bank undertook a modelling exercise that took account of various factors, including land use patterns, net farm incomes, household size, and agricultural income shares. The purpose was to assess the extent of income and employment generation that the land re-distribution process would deliver (World Bank, 1993). The findings of the modelling exercise were that both rural employment and household incomes would

increase as a result of the re-distribution process. The logic of this finding is obvious. With more rural people expected to have access to this vital productive resource as a result of the various components of the land reform process, it seemed obvious that farming would become more widespread and lead to a stimulation of the rural economy through creating higher purchasing power among producers. The increased supply of food in the rural areas would also have a positive impact on food prices and hence real incomes of consumers. The World Bank assessment also anticipated an increased incidence of part-time farming which will generate a multiplier effect by increasing the size of part-time jobs (World Bank, 1993).

The market-assisted land reform has gained in popularity in recent times. This is because it has been found to be a more cost-effective option for promoting equity in the redistribution of assets in developing countries (The World Bank, 2003). Many land reform programmes are taking place today within an environment in which markets have been liberalized and subsidies to the farm sector have been discontinued as part of an economy-wide structural adjustment programme. In such a situation, it is preferable to adopt land re-distribution measures which avoid elements of coercion or the favouring of one group over another. The argument of the World Bank is that when markets are assisted to work in distributing land, more land is transferred to poor people who otherwise would be unable to compete in a completely free and unfettered market (The World Bank, 2003). Such an arrangement is also reputed to avoid the emergence of bloated bureaucracies and non-performing farming units.

With the foregoing in mind, Van Zyl and Binswanger (1996) enumerated a set of design criteria for an effective market-assisted land reform programme, including:

- Adopting self-targeting strategies to ensure that only willing buyers and willing sellers are matched.
- Employing financial grants in such a way as to motivate buyers to seek profitable opportunities and provide the necessary incentives for sellers to relinquish their land in exchange for commensurate cash reward.
- Gives flexibility to the beneficiaries in the choice of enterprise as well as level of investment, etc.

- A decentralized institutional structure that incorporates mentorship after start-up.

Implicit in the theory behind the market-assisted land reform as seen by the World Bank, and the design criteria for the South African programme (see Aliber, 1996; Van Zyl and Binswanger, 1996; Lund, 1996 and others) is a recognition of the centrality of efficient utilization of the re-distributed land. The willing-buyer-willing-seller framework foresees a situation where only people genuinely interested in retaining the land in its current use are attracted to buy the land. The RDP was very emphatic on the need to use land productively for agricultural and other productive pursuits. According to the RDP, the land reform programme was to be a mechanism for building "the economy by generating large-scale employment, increasing rural incomes and eliminating overcrowding" (African National Congress, 1994). Again, this question was so important that the RDP endorsed the instrument of a land tax which would be used to "free up underutilized land…and promote the productive use of land" (African National Congress, 1994). But, interestingly, the RDP also asserts that "land is the most basic need for rural dwellers" (African National Congress, 1994).

In terms of actual programme content, the recent document released by the Department of Land Affairs in preparation for the 2005 Land Summit provides a comprehensive account of what is being done on the land reform programme in the country (DLA/DoA, 2005). This account is all the more authentic for the fact that it is being presented more than a decade after the scheme has been operational and therefore includes also the lessons learnt from the implementation and some of the remedial actions taken to correct mistakes. A number of official documents and academic publications have also been produced in recent times to provide insights into the background and implementation of the land reform programme in South Africa. As has been hinted in passing elsewhere in this thesis, the land reform programme is being implemented through three main elements, namely the land redistribution programme, restitution, and tenure reform.

2.2.2.5.1 Land Redistribution

This component of the land reform programme is considered the "flagship" of the programme (DoA/DLA, 2005). At first, the scheme defined the rather ambitious goal of transferring 30% of the nation's land (about 24 million hectares of agricultural land) to black ownership by 1999. The expectation was that about 3 million people would benefit from this programme. The bulk of this land is held under commercial large-scale agriculture dominated by the white population while the rest is state land taken over during the period of Apartheid rule for various state programme including military and conservation programmes. The new constitution that provided a democratic alternative for South Africa recognized existing property rights (the so-called 'property clause'). This meant that current owners of the candidate land for redistribution would have to be compensated for the land that would be taken from them. The World Bank estimated that the programme would cost between R22-26 billion to implement because market-related prices would have to be paid for the land, on a willing-buyer-willing-seller basis (DoA/DLA, 2005). Annually, this was expected to average between R1.5-1.7 billion.

But, with just about 1% of the land transferred in about 5 years into the programme (DoA/DLA, 2005), the lack of realism in the goal was revealed and in 1999, the programme was reviewed. With the target re-distributable land unchanged at 30%, the duration was extended to 15 years. In addition, steps were taken to facilitate the process which was designed to be almost fully market-driven. One of such steps was the increase in the level of the cash grants provided to prospective land buyers to enable them acquire land and put them into productive use. Initially, an amount of R15,000 was approved per beneficiary household under the Settlement and Land Acquisition Grant (SLAG) established at inception in 1994. This amount was adjusted to R16,000 per beneficiary household in 1998. The grant amount was set at the same level as the housing grant provided by the government.

The idea was that South Africans who were historically disadvantaged by the Apartheid laws and were as a consequence landless and poor would receive a cash grant in that amount and use that to purchase agricultural land, develop and operate same. However,

the reality was different. Farmland prices were, however, above levels that would allow an individual to economically go it alone. According to Lyne and Darroch (2003), an arrangement was worked out whereby individual households pooled their small cash grants to raise enough money to purchase a reasonable sized farm which they would now operate communally.

In time, the unsustainability of SLAG programme was demonstrated quite starkly by the frequent conflicts within the farming groups which were either loose cooperatives, close corporations, and similar bodies. One of the problems revolved around the difficulty in forging a common purpose among individuals who had never engaged in farming and lacked the experience for any kind of profitable enterprise. Their sheer numbers also often proved too unwieldy to be managed effectively (DoA/DLA, 2005). According to Lyne and Darroch (2003), NDA (2003 and 2004) and others, by 2000, only a small part of the transferable land had been transferred and the outlook for the future was quite bleak. As part of an overhaul of the entire land reform programme, the new Minister that assumed office following the 1999 elections suspended SLAG and launched a review of the programme.

The result of the review is the on-going Land Redistribution for Agricultural Development (LRAD) which was established in 2000 and began activities in August 2001. According to a review by Swanepoel et al. (2004), the main element of LRAD is that it enlarged the size of the grant per recipient. Any applicant, not just the very poor as defined under SLAG, qualified for a minimum amount of R20,000 upon meeting the requirement to make an own contribution of R5,000 (Swanepoel *et al*, 2004). A maximum grant of R100,000 can be obtained but requires an own contribution of R400,000 (Swanepoel *et al.,* 2004).

A special feature of the LRAD programme is that the own contribution of R5,000 to qualify for the minimum grant amount of R20,000 can be in the form of applicant's labour valued at going rates. The idea of the own contribution is to secure the commitment of the applicant. It continues the legacy of its predecessor of being limited to previously disadvantaged individuals, invariably from the black population. A minimum

age-limit of 18 years was set in line with national norms. Applicants do not have to have agricultural experience although it is considered essential for the success of the farm business. It is required that the applicant submits a clear business plan which applicants can receive help from the Department of Agriculture to prepare.

These modifications have, however, done little to significantly improve the pace of the process. For instance, by February, 2005, the programme had managed to re-distribute no more than 3.5 million hectares to some 168,000 households. In terms of total land re-distributed, this means that only about 14.6% of the target has been attained in 11 years (6 years since the programme was revised). If current rates do not change, the programme may be able to achieve no more than 30% of its target overall by 2014. The achievement in terms of human numbers is even more worrying, at a mere 4.8% of target, fuelling growing concerns about the rural pauperization as the only visible outcome of the decade-long agricultural restructuring programme. Unemployment rates are still high in the country, generally estimated to average as much as 40% of the working age population (SSA, 2004).

2.2.2.5.2 Land Restitution

The other component of the land reform programme is Land Restitution by which presently dispossessed persons or groups (including communities) that could establish pre-1913 ownership of land can have such ownership restored. According to the White Paper on the Land Reform Programme (DLA, 1997), Land Restitution involves "returning land, or compensating victims for land rights lost because of racially discriminatory laws passed since 19 June 1913". Official estimates put the number of affected persons at more than 3.5 million who were forced out of their original land and compelled to settle in "scheduled" areas which where later designated "homelands". Three sets of legislations provided the legal backing for the actions, namely:

- Native Land Act No. 27 of 1913;
- The Development Trust and Land Act No. 18 of 1936; and
- The Prevention of Illegal Squatting Act No. 52 of 1951.

These actions went under different names as follows: the "black spot removal", "removal of labour tenants", "removals from mission stations", "removals for the sake of forestry requirements", and "internal removals". The new Constitution of South Africa that came into force in 1996 provides in section 25, sub-section 7, that:

> "a person or community dispossessed of property after 19 June 1913 as a result of past racially discriminatory laws or practices is entitled, to the extent provided by an Act of Parliament, either to restitution of that property or to equitable redress."

Already foreseen during the process of negotiation for the establishment of a multi-racial democratic system in the country, this provision arose from the Restitution of Land Rights Act No. 22 of 1994. To drive the process, a body known as the Commission on the Restitution of Land Rights was established and vested with the following tasks:

- To promote equity for persons or groups dispossessed by the policies of the past, especially those who are as a result landless and can be classified as poor, including the rural poor;
- To facilitate a developmental orientation to the solution of the problem by encouraging the relevant stakeholders to organize in the framework of viable development initiatives;
- To implement the restitution process in a manner that would promote reconciliation within the country;
- To contribute towards an equitable redistribution of land rights in the country.

In addition, a Land Claims Court was established to deal with ratifications or adjudication in respect of claims.

As would be expected, this scheme made a slow initial start. Having gone into operation in 1995 as in the case of the other components, only 41 claims had been decisively settled by 1998, three years after. It was obvious that things were not going well. The next general elections were coming in 1999 and President Nelson Mandela was soon leaving

office as he had pledged. At the same time, the disgruntlement of the NGO sector, including the "landless" people's groups represented by the Landless People's Movement (LPM), provided grounds for worry against the backdrop of the developing situation in Zimbabwe where the land reform programme had clearly gone out of hand.

Five main concerns were highlighted by the secretariat of the Commission on the Restitution of Land Rights as follows:

- Duplication of functions between the Department of Land Affairs and the Commission
- Improperly defined lines of accountability
- A dualistic approach to policy and procedures
- The slow pace of the mandatory judicial process for settling claims
- Lack of integration of the restitution process into the broader land reform programme.

A review was subsequently conducted in the course of 1999 and led to the enactment of an amendment to the Restitution Act. The powers of the Minister of Land Affairs received a boost in the amendment as claims could now be finalized at the ministerial level rather than in the Land Claims Court. Within a year of the review, the pace of land claims settlement had picked and the process was moving quite smoothly. An assessment conducted in 2001 showed that the review process had been effective in unshackling the process from its bureaucratic straightjackets. Table 2.2 presents results of the assessment.

Table 2.2: Land Restitution Outcomes as at March, 2001

LAND RESTORATION	
Households awarded land	16 764
Land cost	R191,270,645.00
Hectares of land restored (Court process)	173 805
Hectares of land restored (Ministerial approval)	109 421
Total beneficiaries receiving land	100 584
FINANCIAL COMPENSATION	
Households awarded compensation	10 921
Financial compensation awarded (Land Claims Court)	R21,860,330.00
Financial compensation awarded (Ministerial Approval)	R287,043,658.10
RESTITUTION TOTAL	
Claims settled as at 31 March 2001	12 094
Total households	27 685
Total restitution beneficiaries	164 661
Total restitution cost	R500,174,633.10

Source: Department of Land Affairs and Department of Agriculture, 2005

2.2.2.5.3 Land Tenure Reform

The third key component of the land reform programme is the reform of land tenure systems in the communal areas to enhance the accessibility of land within the former independent homelands where traditional systems of land tenure were in force previously and largely prevail today. It is necessary once again to delineate the specific areas of the country where the "independent homeland administrations" were established during the Apartheid era. Parts of four of the present nine provinces were affected. These include the Eastern Cape, Limpopo, Kwazulu-Natal, and North-West provinces. According to the old administrative structure, these areas were known as the Ciskei, Transkei, and Kwazulu. Today, agricultural production still occurs in areas designated "communal areas".

The past practices featured control by the traditional power élite which administered the allocation of land to the members of the community (Jeppe, 1980). As has been noted earlier, the communal tenure system in the South African communal areas mirrored the practices in other parts of Africa where the traditional authorities remain the trustees in land matters and wield considerable powers. What has changed in South Africa, though,

is that the powers of the traditional authorities have been scaled down or officially eliminated without a corresponding and clear modern governance arrangement to replace them. This has meant a considerable degree of confusion, while opportunities for corrupt manipulation of the process still exist for the traditional leaders. According to Lyne, Roth and Troutt (1997) and Lyne and Darroch (2003), the main problem has been the increasing unpredictability of the whole system. It is understandable that where clear rules and guidelines are absent, the scope for arbitrariness will be high. In a system characterized by land scarcity due to inequitable sharing of a limited supply of land within the former homeland area, economic opportunities are severely limited for those whose livelihoods depend almost exclusively on the agricultural sector. The highly constrained land rental market due to uncertainties as to whether those who rent will eventually return land to original owners is another consequence of the imprecise system of rules on land ownership and distribution within the former independent homelands of the country.

In order to protect the residents of these former homelands against the abusive and corrupt practices of the traditional leaders, an interim law was passed in 1996. This law is referred to as the Interim Protection of Informal Land Rights Act 31 of 1996. But ultimately, the need is for the people to have ownership of the land by legal changes that introduce more secure land rights in these communal areas. The progress in this regard seems to have now come in the form of the recently enacted Communal Land Rights Act (CLARA) of 2004. The main emphasis of the new Act is to facilitate the transfer of communal land to tribes as well as to individuals and communities. While this is no doubt a welcome improvement on the current situation of landlessness among many residents of the former homelands, it is not surprising that a number of groups will find that this threatens their existing privileges and powers (Lyne and Darroch, 2003). For instance, while the CLARA was still in draft form being circulated for discussion and debate, the Inkatha Freedom Party which draws strong support from rural Zulu tribes people, protested that the Act would disempower traditional leaders (Lyne and Darroch, 2003).

In the area of land tenure, the government has two other related concerns, namely the issue of labour tenancy, and the frequent problems of eviction of farm workers from

commercial farms. In the first case, namely the labour tenancy issue, this is an arrangement whereby black farm workers use their labour to pay for usufructuary rights to a portion of a white farmer's land. This was an arrangement that was worked out to circumvent the Apartheid legislation incorporated in the Natives Land Act of 1913 that prevented blacks from owning land in areas designated white areas. Even with Apartheid laws annulled and a land reform programme running into its second decade of implementation, some of these practices still remain and continue to be a source of considerable worry for the government which has enacted a specific legislation, the Land Reform (Labour Tenants) Act 3 of 1996. The aim of this Act is to make the land rights of commercial farm workers and labour tenants more secure on the commercial farms.

The issue of eviction of black farm workers from white farms is clearly a labour relations question for which a comprehensive set of labour legislations exist outside the agricultural sector. Since the end of Apartheid rule, workers' rights have been strengthened nationally. But it would seem that the agricultural sector fits into a special category probably due to the relatively more powers a farm owner would generally be expected to have arising from the nature of farming, land, etc. The government is of the view that, as part of the overall programme to redress past wrongs, such employment insecurities should be discontinued. In pursuance of this, the government has put in process a legal framework in the form of the Extension of Security of Tenure Act 62 of 1997 (ESTA). The idea of ESTA is to protect farm workers from unlawful evictions from the farm which have implications for both their employment and accommodation as many of them live and work on the farms. Many farms have also built schools for the children of the farm workers. Eviction in this case would no doubt have far-reaching consequences for the entire family of the farm worker. Hence the need for protection of land rights to ensure that loss of job and accommodation can only happen on legal grounds.

A review carried out for the National Department of Agriculture (DoA) by Swanepoel *et al*. (2004), suggests that there are serious production problems associated with communal land use. According to the review, while the provincial departments of agriculture in the affected four provinces deploy a large part of their budgets and human resources towards

agricultural development in the communal areas, production falls far short of potential. Findings reported by the Eastern Cape Department of Agriculture show that out of a potential maize yield of over 4 tonnes per ha, farmers realize only about 200 kg per ha. In Kwazulu-Natal, the actual production is about one-sixth the proven potential. While as much as 38% of the national beef herd is kept in the communal areas where crop production remains an adjunct to livestock production, extremely low animal off-take denies both farmers and consumers the benefits of this important sub-sector.

Some of the factors contributing to the poor production performance in communal areas have been identified and summarized as:

i. Continuous shallow ploughing of the same land creates an impermeable layer of soil which hampers the flow of moisture to crops grown under rain-fed conditions;
ii. Forced fallowing of large tracts of land as a result of inadequate supply of labour, inputs and equipment;
iii. Sub-optimal resource use as a result of over- or under-investment of resources which leads to low productivity;
iv. The use of community-based models of empowerment which lead to serious internal conflicts that consume an inordinate amount of resources and time and contribute to low production and productivity.

For any tenure reform programmes to lead to agricultural development, including the integration of the black population to the country's agricultural economy, it is imperative to take a holistic view of the problem. Some of the issues highlighted above will certainly be crucial, but further detailed studies to ascertain the problems and what strategies are need to contain them, will be necessary.

2.2.2.6 Agricultural Taxation and the Rural Land Tax Debate

Some of the longest running debates in the land market of South Africa concern the issues of taxation of agricultural land. In the era of land reform in the post-Apartheid South Africa, the main concern has been on how the mechanism of taxation can be used

for increasing the availability of land in the market to increase the volume of land transactions by encouraging land owners not to hold on to unproductive land. The next few subsections examine some of the salient issues related to the debate.

2.2.2.6.1 General Considerations on Taxes

It is necessary for a more informed view, to present the wider evidence on the importance of taxes in general as reflected in the economics literature. A number of researchers have worked on the broad subject, notable among them being Stiglitz (1986), Stallman & Jones (1997), Mankiw (1998), etc. It generally considered that taxation is good from the point of view of generating resources to finance national development and redistribute the national wealth in a more equitable manner. A tax system is therefore evaluated on the basis of its capacity to carry out these functions while not imposing corresponding hardships on the society. On the basis of the review of the various works on the subject, the following attributes of taxes can be summarized:

- Economic efficiency: it has been said that taxation is a re-distributive mechanism. This means that it must achieve this without interfering the efficient allocation of other resources to make the economy productive. If this is not the case, then the purpose of taxation would be defeated. At the same time, the tax system must leave the consumer choices undisturbed, which is to say that consumer should be free to consume after the tax regime is imposed what they consumed before the imposition of the taxation. In the opinion of Stallman and Jones (1997), the condition of economic efficiency requires that the tax system be as broad-based as possible, as opposed to having a narrow base, so that to the extend practicable, inefficiencies are kept to a minimum.
- Competitiveness: it is required that a tax system does not put a country at a disadvantage vis-à-vis other countries in attracting investors or buyers of its goods and services. This is the whole point of making the tax system competitive so that it is not so high that it discourages foreigners or too low that it generates very little to finance needed development. A tax system should be able to attract new business and retain existing ones and should provide the necessary incentives for tourists and

others whose spending behaviour influence economic activities in the country, one way or another.

- Administrative simplicity: the implementation of a tax scheme is very important. Often, a tax law may be in place but implemented in a way and manner that hurts rather than helps the economy. Some of the difficulties may be that the system is so administratively unwieldy that it leaves considerable scope for officials to mismanage the system and obstruct the smooth flow of the rewards to the national treasury. This is the case when a tax system allows a lot of loopholes that creates opportunities for corrupt gain for those who are entrusted with its management and also allows room for the potential tax payers to avoid paying tax. When a tax system is simple, it is easy for the taxpayer to understand it. Such a tax system is also easier and less expensive to administer.
- Adequacy: This is easily the most important attribute because it is at the heart of the very reason a tax is imposed, namely to generate sufficient funds to finance the various obligations of the government. An adequate tax system is therefore one that is capable of generating enough revenue to meet the developmental needs. This means that the tax system must be responsive to a number of demographic factors such as population growth rate, labour force growth rate, etc.
- Fairness and equity: These are important attributes in terms of the distributional aspects of a tax system. The tax system should not have a discriminatory element that is it must bear equally on groups or individuals in the same circumstances. This is horizontal equity which requires that all entities in the same relative socio-economic circumstance must be taxed to the same degree. The other category is vertical equity which differentiates between groups and individuals in dissimilar circumstances. This raises an important question in respect of the appropriate methodology for evaluating the equity of a tax system – based on the payments received by the tax payers, or the ability to pay.

As Stallman and Jones (1997) observed, there are no ideal tax systems with all the above attributes. The design and implementation of a tax system, regardless of the level of national administration for which it is intended, is a matter of trade-offs and compromises. In discussing taxes in general, it is essential to bear in mind that taxes

general specific effects and the field of welfare economics has studied these in some detail. As Mankiw (1998) has observed, taxes generally make both buyers and sellers worse off than previously. The direct or indirect effect of the tax on buyers and sellers is known as the tax burden or the tax incidence. Mankiw (1998) notes that the tax burden is distributed between buyers and sellers and the associated supply and demand elasticities determine the severity of the tax burden. The more inelastic the supply, the greater the tax burden on the seller relative to the buyer. Conversely, the more inelastic the demand, the greater the burden on the buyer relative to the seller. Figure 2.1 illustrates the effects of taxes on buyers and sellers when tax is imposed at a given level within a specific market.

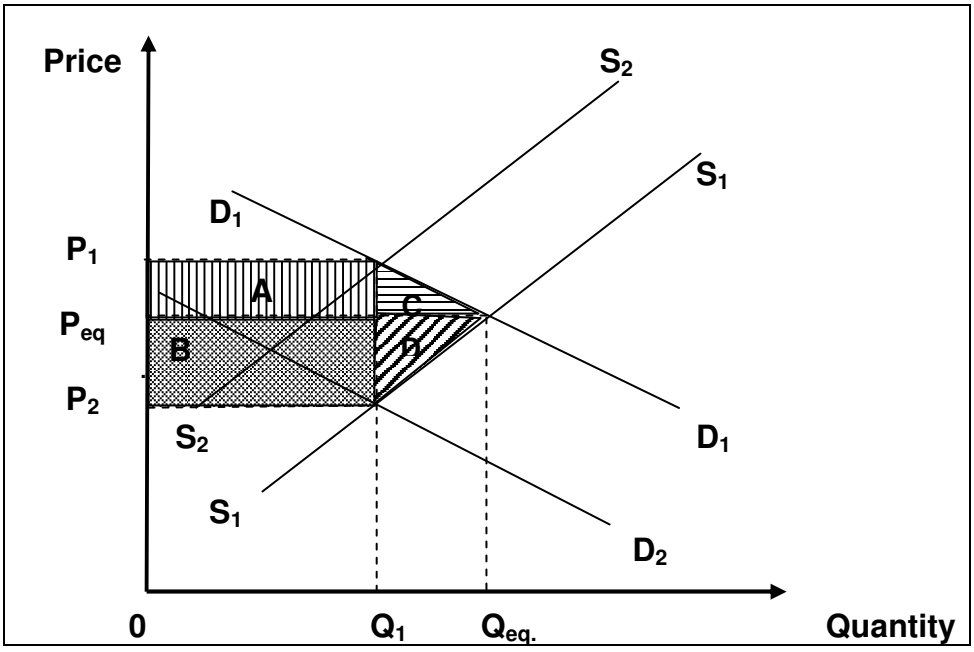

Figure 2.1: Illustration of the effects of taxes on buyers and sellers

Supply and demand analysis represent a useful and powerful tool for analyzing the various effects that different types of taxes can have on individuals and groups in the society (Frank, 1994). If we assume the imposition of a constant tax per unit of an output, we should be interested to know how this impacts on the equilibrium price of the commodity and the quantity of the output that will be supplied at the ruling price.

Suppose the tax is imposed on the seller, with the original supply schedule represented by $\mathbf{S_1S_1}$ and price at P_{eq} which represents the equilibrium price associated with quantity

supplied at $Q_{eq.}$ The imposition of the tax on the seller will lead to an increase in the price from the original equilibrium point at $P_{eq.}$ to a new level at P_1. The seller's wish will definitely be that he is able to completely cover the extra costs brought about by the tax and still sell the same quantity. But the market situation suggested by the slope of the supply curve is a competitive one where it is not always possible for a seller to "eat his cake and have it". What would normally happen is that a buyer, on whom no tax has been specifically targeted, but who all the same is required to indirectly assume responsibility for the tax burden of the seller, will become less motivated to buy the commodity to the same degree at the higher price.

Thus, the first thing that happens comes from the reaction of the buyer in reducing the demand for the commodity which results in the demand curve $\mathbf{D_1D_1}$ shifting to the left to $\mathbf{D_2D_2}$ where a preference is declared for a lower price P_2. Since that price means that the seller will sell at a loss if the same quantity is supplied, the logical thing will be to reduce the quantity supplied to Q_1 which corresponds to a new intersection point of $\mathbf{S_1S_1}$ and $\mathbf{D_2D_2}$. But this is an unsustainable position because at that price, the seller's costs are not even being covered. This will force the buyer to accept a higher price at P_1 while buying a reduced quantity Q_1. So, a tax imposed on a seller forces the seller and buyer into a compromise in order to accommodate the reduced enthusiasm of the buyer for the higher-priced commodity and the frustration of the seller with higher costs. Thus, there is a sharing of the tax burden here between the buyer and seller – the seller receives a reduced price while the buyer pays a higher price. If we assume the tax burdens for the seller and buyer are t_s and t_b, respectively, their shares of the tax burden can be denoted as follows:

$$t_s = \frac{P_{eq} - (P_1 - T)}{T}$$

Where

t_s is the tax burden on the seller

P_{eq} is the original equilibrium price

P_1 is the final price received by the seller

T is the amount of tax imposed per unit of commodity.

In the same way, we can denote the buyer's share of the tax as follows:

$$t_b = \frac{P_1 - P_{eq}}{T}$$

Where t_b is the tax share of the buyer
P_1 is the final price paid by the buyer
P_{eq} is the original equilibrium price
T is the tax imposed on the seller.
It should be noted that both t_s and t_b are proportions or shares of the absolute size of the tax imposed. In that case, both should sum to unity according to the following relationship:

$$t_s + t_b = 1$$

Developing further the idea of the tax burden, it is important to note that although the buyer eventually pays P_1, the difference between what the buyer was willing to pay (P_2) and what she eventually pays (P_1) does not all accrue to the seller because of the tax ($P_1 - P_2$) which accrues to the government. In Figure 2.1, this corresponds to areas A and B. While the buyer bears the portion B, the seller bears the portion A. As a result of paying these taxes, both the seller and the buyer incur costs equivalent to losses in the producer and consumer surpluses respectively. The loss in consumer surplus is equivalent to the area D, while the loss in producer surplus is equivalent to the area C.

It is usually of both empirical and policy interest which of the parties incurs the most cost from the imposition of the tax. That is, who bears the bulk of the burden of tax given the relation above? In other words, which is greater, t_s or t_b? There is no fixed rule on who bears the most burden of the imposed tax. As indicated earlier, this would depend on the slope of the demand and supply curves (Frank, 1994; Mankiw, 1998). When elasticity is explained in its commonplace, lay meaning as the responsiveness of the quantity bought to changes in price from the differential viewpoints of the buyer and seller, the tax impacts can be a little clearer. According to Frank (1994), if the supply is highly

unresponsive to changes in price (vertical to the horizontal or almost so), then t_b (the tax burden on the buyer) is close to zero while t_s (the tax burden on the seller) is close to unity. This means that the seller bears the bulk of the tax. On the other hand, if demand is highly unresponsive to price, that is almost horizontal, then t_s will approach zero while t_b will be almost unity.

In the situations above, a relatively inelastic supply schedule implies fixed supply and absence of close substitutes to which the buyer can turn. On the other hand, a relatively elastic supply curve implies that supply is highly variable and that the buyer can choose among substitutes. In the first case, the buyers bear most of the burden of the tax. In the other case, the suppliers do not have any alternative than to go on supplying the product. As a result, the bulk of the tax burden falls on them. This provides some endorsement to the notion that "a tax tends to fall most heavily on the side of the market that can least escape it" (Frank, 1994). Similar points are also made with respect to capital gains tax, suggesting that the poorer segment of the economy absorbs the most tax while the wealthier segment has the ability to avoid or delay capital transactions so that capital gains accrue without being realized.

The foregoing statement about who feels the pinch most compels policymakers to be extremely cautious in deciding on any tax to raise revenue for the government. The common approach of politicians is to impose taxes on those who "can best afford them" (Frank, 1994). The interest on who feels the tax burden also leads to the consideration of some important tax concepts. Distinction is commonly made between **legal incidence of the tax** and the **economic incidence of the tax** (Frank, 1994). In the case of legal incidence, the question is who is being targeted by the tax. The tax either targets buyers or sellers. The economic incidence of the tax refers to the shares of the tax burden that is borne by different parties. Regardless of the legal incidence of the tax, that is, where the tax is placed, the burden of tax will be shared in the same way. It is the slopes of the supply and demand curves that determine how the tax burden is distributed across the population. When the slopes of the demand and supply curves are the same, the tax burden is more less shared equally between the parties involved in the transaction.

The other costs associated with taxation are referred as deadweight loss or social costs of the tax. When some external economic instrument leads to an increase in the price of the commodity above its equilibrium level, it is said that a deadweight loss has occurred. This is usually associated with the introduction of the value- added tax (VAT). There is always an intrinsic value attached to a commodity by the consumer which they try to compare with the price on offer. According to Mankiw (1998) when the value attached to the commodity by the consumer exceeds the price on offer, they buy, otherwise they don't. When the consumer buys because of a positive assessment of value relative to product price, there is a "gain from trade" (Mankiw, 1998). When the consumer does not buy because of a negative assessment of the price relative to the intrinsic value, there is a loss from trade (Mankiw, 1998). Figure 2.1 can be used to analyze this situation in the same way as the previous analysis related to the imposition of a tax on the seller of a commodity.

2.2.2.6.2 Agricultural Land Tax in the Global/Historical Context

The debate on the pros and cons of a land tax in South Africa has generally drawn from economic theory, international experience and the unique demographics of the country itself. Appeal was usually made to international and historical experience to show that governments the world over have always relied upon land to generate the necessary tax revenue to finance the affairs of state (Franzsen, 1992). These motives were shown to be invariable, whether one was looking at ancient China during the Huang Ti and Hsai Dynasties (2700 – 2200 BC), Egypt of the Pharoahs, Mesopotamia, or the Roman Empire (Franzsen, 1992). On the basis of a historical assessment by Woolery (1989) as cited by Franzsen (1992), perhaps the most famous land tax advocacy of the modern era is credited to Henry George whose idea was that governments could lead themselves out of poverty by heavy taxation of land over and above what was then deemed tolerable. Bird and Slack (2002) show that in the 1990s, both developing and industrialized countries raised the proportions of their local taxes attributed to property and land taxes. For instance, about 40% of the locally derived taxes in the developing countries came from property and land taxes while the figure for industrialized countries was about 35%. The

transition economies performed poorly in this regard, at a mere 12% (Bird and Slack, 2002).

In general, it has been established that land taxes make it possible for local governments to exercise fiscal responsibility without correspondingly distorting the economy (The World Bank, 2003). The firm belief is that a tax on land compels landowners to make effective use of their land, especially where the tax is based on the ownership of the land rather than the use to which it is put or the output from the land. International experience (Brueckner, 2000; The World Bank, 2003) equally suggest that land tax is an ideal revenue source for local government financing since it is directly tied to a source of local production rather than distortionary transfers from the central government treasury. It has also been shown that land taxes can induce local development as local authorities realize an obligation to deliver much-needed services to those who pay for them.

In an age of decentralization of governmental structures to the local level, many observers (among them Skinner, 1991; Strasma, 1993; Boadway, 2001 and Eaton, 2001), think that the ability to raise their own finances will make the process more effective. Enquiries into the role of land taxation in economic development has been going on for a long time (Van Sickle, 1925). The fact that local beneficiaries of the local taxes directly bear the tax burden is also considered an important advantage of an effective land tax especially if the local authorities have the full and complete discretion to set the tax rates, identify the taxable land/taxpayers, assess them and carry out the necessary collection of the due taxes (The World Bank, 2003).

The arguments (Wald, 1970; Holland, 1970; Harris, 1970; Woolery, 1989; and Franzsen, 1992) in favour of a land tax put a lot of emphasis on the attributes of land which predisposed it to much easier tax assessment and administration, including the fact that:

- Land is not concealable, which must be frustrating to those who have a strong propensity to avoid other forms of taxes based on less tangible indicators of wealth;
- Land is locationally stable and therefore convenient to access and assess;

- The identity of the taxpayer for a land tax is easily established without complication;
- Land is an asset with perpetual positive value upon which a tax can be assessed.

2.2.2.6.3 The South African Experience with Land and Agricultural Taxation

Very few issues have dominated the agricultural policy environment of South Africa for as long as the questions of agricultural taxation and rural land tax. But for all practical purposes, they have been more important by the heated debate they have generated than by their actual impact since systematic taxation specifically targeting the agricultural sector has yet to be implemented in the country. The questions of agricultural taxation and the land tax have also been the most contentious, being known to generate a great deal of emotional reactions from the farming community and others (Franzsen and Heyns, 1992; Van Schalkwyk, 1995; and Dannhauser, 2001).

Figure 2.2 provides a simple framework for analyzing the incidence of a land tax and its social costs. As is well known from economic theory, the supply of land is fixed in the pure case which gives us a supply curve that is perfectly perpendicular to the horizontal axis. One of the most famous cases for a land tax was made by Henry George on the grounds that it would help to re-distribute national wealth and alter the obscene picture of "monstrous wealth and debasing want" (Mankiw, 1998). Whether or not such a redistribution of national was feasible given the characteristics of land and the economic realities can be examined by recourse to economic analysis.

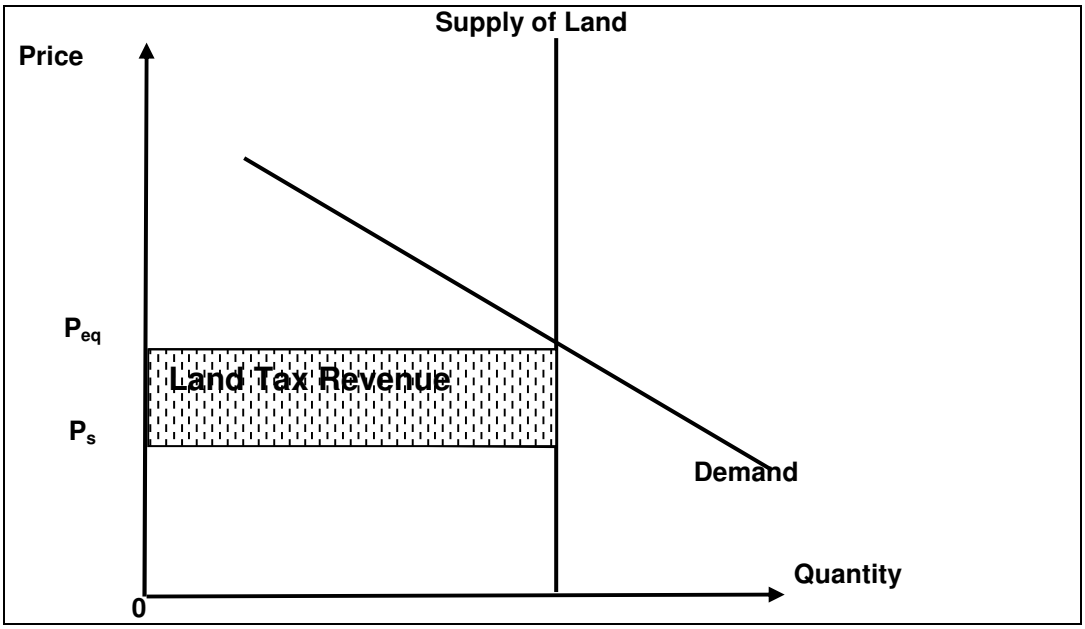

Figure 2.2: Illustration of thespecial case of land tax incidence

Figure 2.2 presents a negatively sloping demand curve for land in relation to a vertical supply curve depicting an inelastic supply of land. If we assume an equilibrium price of land, P_{eq}, which prevails at the point where the negatively sloping demand curve intersects with a vertical supply curve, economic theory predicts that the introduction of a land tax would lower the price of land to a level P_s which is below the equilibrium value. The difference between the equilibrium price and the market price of the land accrues to the government as tax revenue from land. According to Van Schalkwyk (1995), the decline in land price as a result of the imposition of a land tax would happen because it would have meant an additional cost to the farming community. The options of discounting the extra tax-induced production cost by, for instance, raising product prices or land rents, do not seem quite feasible.

But the foregoing scenario is true only in the short run. In the long-run, a lot of changes are expected to take place within the physical environment of the land market, including with respect to the infrastructures associated with land use. This will have implications for land productivity (that is, agricultural output from a unit of agricultural land), and therefore translate into a change in the supply of land from one period to the other. In such circumstances, a given unit of farmland can be priced higher than previously to take

account of the productivity-enhancing improvements. This consideration is also discussed generally in relation to land quality issues and is easily handled where land quality indices are available.

According to Nieuwoudt (1995), such physical infrastructures that can influence the actual supply of land include irrigation equipment, development of pastures for livestock feeding, fencing, orchard development for horticultural production, etc. Since land tax also falls on improvements such as these, the prospects of higher taxes my discourage such investments and so lead to situations where agricultural development stagnates or farmland prices do not rise over time. To that extent, a rural land tax may turn out to be inimical to agricultural progress.

The fact that the country's commercial agricultural sector evolved as a highly sheltered sector that enjoyed a high degree of protection from successive governments is probably an important factor in the difficulty successive government's have had in successfully selling the idea of land taxes. As has been very well-discussed in the literature, for most of the apartheid era in South Africa, and especially in the 1980s, agricultural policy defined a single aim of attaining "self-sufficiency in respect of food, fibre and beverages and the supply of raw materials to local industries at reasonable prices" (RSA, 1984, cited by Van Schalkwyk, 1995).

In order to achieve this aim, the government extended a wide variety of subsidies and state support schemes to motivate increased farm investment and production. Van Schalkwyk (1995) summarized this farmer support environment to embrace such incentives as setting of domestic prices above world market prices, provision of sophisticated extension services that facilitated access to improved technologies and other forms of preferential treatment. This was also a period during which the international community had imposed a set of economic sanctions that called for strong internal response towards self-preservation. Thus, it would obviously have seemed anathema to turn around and start taxing the same farmers.

But agricultural taxation in one form or the other is not a completely unfamiliar variable. According to Franzsen (1992), prior to the establishment of the Union of South Africa in 1910, a wide range of taxes had been levied in different parts of the vast area that now constitute the Republic of South Africa. As early as 1677, some form of agricultural taxation had existed in the Cape of Good Hope (area now embracing the Western Cape Province) in the form of what was known as "agricultural income tax payable in kind" and administered by the Dutch East India Company better known by its Afrikaans acronym, VOC – *Vereenigde Oost-Indische Compagnie*. This tax was also described as a "tithe" to the extent that it represented a proportion of the income earned in the same way as the one paid in Christian Churches, or "zakaath" as in Islam. To this tax was added two more forms known as "transfer duty" in 1686 and "recognition fees" that took effect in 1714. Citing his earlier research (Franzsen, 1990), Franzsen (1992) revealed that another form of tax known as the "stamp duty on transfer deeds" also came into effect in 1714. The first violent resistance of the indigenous Khoisan and amaXhosa against European settler occupation and expansion took place between 1799 and 1803 and one is left to imagine whether there was a link between the introduction of these taxes and local reactions (Morris, 2004).

Outside the Cape Province, taxes that affected the farming communities were also in effect. For instance, in three of the political entities that later came under the umbrella of the Union of South Africa, namely the Natal Republic, the Transvaal (then known as the South African Republic) and the Republic of the Orange Free State, an elaborate system of taxation was introduced to bring a broad spectrum of the citizenry within the tax net (Franzsen, 1992). In these three Republics, taxes as diverse as transfer duty, stamp duty on transfer deeds, hut tax, land tax, and property tax were imposed on the inhabitants (Franzsen, 1992). An indication of the comprehensiveness of the tax system was the existence of a tax on absentee landlords whose uninhabited dwellings were taxed, and the hut tax which embraced subsistence farmers and the peasantry (Franzsen, 1992). In a review of the literature on the land tax in South Africa in the period 1652-1994, Van Schalkwyk (1995) adds that another purpose of the hut tax was to create a strong income need among peasants that would motivate them to seek work in gold mines and sugar cane fields as general labour.

As it became clear in the early 1990s that land reform was inevitable in South Africa and was only a matter of time, conversation and debate ensued on the implications of introducing a land tax in the country. One of the major concerns around the success of the land reform programme was the potential cost to the government of implementing what would obviously be a monumental undertaking in view of the large number of potential beneficiaries and the amount of the land to be re-distributed. Experts reasoned that a tax on land would provide government with enough resources to finance the land reform programme (Franzsen, 1992; Van Schalkwyk, 1995; Katz Commission, 1998; DLA/DoA, 2005).

Evidently, Van Zyl and Vink (1992) did not share the enthusiasm of the those who think land taxation will work and actually saw ample scope for immense administrative overhang in a land tax in South Africa. Their conclusion that the introduction of a land tax in South Africa would contradict international experience may have drawn largely from the uniqueness of the structure of the agricultural sector with its sharp dichotomies and the background of far-reaching state support applied disproportionately on the commercial, large-scale agriculture sector that was largely white-owned.

In any case, the debate raged on into the era of land reform which came into effect in 1994. In May 1995, a Land Tax Sub-Committee of the Katz Commission, sat for the first time to investigate the possible implications of a land tax in South Africa (Katz Commission, 1998; Dannhauser, 2001). The White Paper on Land Policy has identified a number of clear advantages of the rural land tax for South Africa, among which the following have been emphasized:

- Intensification of land use which would lead to landowners releasing surplus land into market to avoid paying tax on idle land;
- Elimination of land speculation by adjusting the tax to align with the eventual use of the land and therefore discourage the tendency to acquire land cheaply purportedly for agriculture and then turn into non-agricultural use which might have higher returns. It is expected that such a graduated tax in this case will reduce the farmland prices and will therefore benefit small-scale farmers for whom the high price of farmland is a strong disincentive;

- The problem of absentee landlords will be eliminated by a rural land tax, so that only genuine farmers will acquire land. Again, this will bring land prices down;
- When the rural land tax is combined with the removal of existing rules on sub-division of farmland, it will become easier to re-distribute land from large holdings to medium and small holdings and this will be beneficial to small-scale farmers who can then acquire only the size of farmland they can operate;
- It will be an additional source of budget revenue for the government without corresponding administrative costs since it is an easy tax to administer.

The recent Land Summit held in Johannesburg in July 2005 came up with the recommendation that a rural land tax should be introduced in the country and the Minister of Agriculture and Land Affairs, by her pronouncements, appears favourably disposed to such a policy regime. It would seem that whether or not a land tax is introduced in South Africa is only a matter of time.

Despite its relative popularity, a number of issues make the introduction of land taxes a carefully considered option. These issues relate to the fairness and equity as well as effectiveness. In this regard, policymakers and researchers outline a number of requirements for administering a land tax, including having a comprehensive official record (that is, a cadastral record) of available land portions/plots, their sizes, values, ownership statuses, production parameters and marketing data, specifically with respect to input and output costs and prices (The World Bank, 2003). There are also frequent concerns with the basis for the land tax, i.e. whether it will be based on the land area, its value, or some other criteria and how to deal with the technical tax administration questions of identification, assessment and collection. According to Bird (1974), all these require a clear legislative position on property rights and an administrative structure that routinely collects and updates information on land and its ownership and sets and implements guidelines for assessment, collection and enforcement of land tax.

Questions are also often raised about what the optimum tax structure should be to ensure that collection rates are good and discontent is kept at a minimum. Hamid (1983) and Hoff (1991) have shown that the introduction of a land tax in poor societies with

inadequate infrastructures for insurance in the presence of excessive farm risks can exacerbate inequalities and lead to land being concentrated in a few hands. It is therefore generally considered that a "simple, possibly flat, tax that may be waived for very small landowners" may be more manageable and lead to better collection rates, as examples from Kenya and Indonesia show (Bird and Stock, 2002). How much discretion the local authority should have in the administering of the land tax system is also a major issue. If the implementation of a land tax will have the effect of strengthening fiscal responsibility of the local authority, then it should have the opportunity to build up the necessary in-house capacity in that area.

But pressures to deliver services within a tight budget constraint may lead to a revenue maximization behaviour on the part of the local authority that may hurt rather than help the investment climate. For instance, too high a tax rate may lead to investors leaving the particular local area in favour of areas with more favourable tax regimes. Conversely, too low a rate may put the local area at a serious disadvantage in terms of revenue maximization. For these reasons, it has been suggested some central government intervention in setting the broad bands of tax rates within which the local authorities can then exercise discretion. According to Boadway (2001), both minimum and maximum rates help in avoiding two of the most serious pitfalls of tax administration, namely tax competition and tax exporting. Tax competition can arise when better-off local governments use lower tax rates to lure businesses away from worse-off local governments unless there is minimum rate below which they cannot go. On the other hand, if a maximum tax rate is not established and enforced, there is a tendency to impose high tax rates on businesses with the intention of passing on the tax burden to non-residents. According to Boadway (2001), this latter situation delinks those who pay the taxes from those who benefit from them.

2.3 Chapter Summary

The chapter threw more light on the politics, economics, and policy environment of land and its role in the agricultural sector and in a new multifunctional agriculture framework to set the context for discussing issues of land pricing over time. The chapter then

commenced the more formal review of the relevant literature on the central theme of the land question in South Africa.

The chapter reviewed literature on the historical context of the South African land question from the arrival of the European settlers in 1652. The dispute over whether the arriving white settlers met a thriving agricultural economy and displaced it or found a people completely uninterested in agriculture and thus introduced a whole new industry remains unresolved. But the literature noted growing tensions and violent conflicts between the settlers and the indigenous population beginning from around 1659. This black uprising was quelled as were several others as the settlers moved inland from the coast and conquered more and more territories. As these conflicts continued, gold and diamond were discovered in parts of the territory and thus was born a novel pattern of labour utilization under which the indigenous male population now virtually deprived of agricultural land, worked for wages in mines while the female population tended was remain of any agricultural enterprise.

The growing affluence of the Dutch settlers on account of their thriving agricultural enterprise became another source of conflict with other settler communities, namely the English who were then beginning to make incursions into the territory. The review showed how the Anglo-Boer War that ensued towards the end of the 19th Century introduced further instability in the region and created the phenomenon of the "poor white" as a result of the deliberate destruction of Dutch settlers' farms by the English soldiers. Every Afrikaaner farm the English could not take, they destroyed. This phase was followed by the establishment of more formal and modern governance systems and eventual unification of the entire territory to create the Union of South Africa in 1910 under which the infamous Native Lands Act of 1913 and other repressive laws were enacted. It was also during this period that "black reserves", later transformed into the "independent homelands" and "self-governing territories", were created as home to the black population. Alongside these laws were policies which lavished state largesse on white commercial farmers.

From the mid-1980s, it was obvious that the Agricultural Policy was unsustainable and

efforts were made to deregulate the agricultural sector and provide limited empowerment to black farmers within the black settlements and reserves. In many parts of the country, this resulted in the settlement of black farmers on land expropriated from white farmers and developed and demarcated by the government.

Since then, a democratic dispensation in South Africa is pursuing a bold programme of land reform to redress the wrongs of the past and achieve greater equity in the ownership and distribution of land. Three main components of the land reform programme are the land redistribution programme which promises to redistribute 30% of land currently held by the white commercial agriculture to black farmers by 2014, the land restitution, and tenure reform. The government is also pursuing a comprehensive programme of agricultural restructuring that aims to integrate the black population into the nation's agricultural economy. In the meantime, long-standing debates are continuing on the question of introducing a land tax in South Africa, building upon systems that existed in various forms from pre-Colonial times.

CHAPTER 3
RESEARCH ON AGRICULTURAL LAND PRICES

3.1 Introduction

The present chapter focuses specifically on Agricultural Land Prices in terms of previous studies carried out on the subject, the different motivations for such studies, the methodologies used, and the significant findings and outcomes of such investigations. To set the context for the review, the place of agricultural land prices as prices *per se* and within the whole agricultural/farm setting is examined. This is an attempt to address the fundamental questions, "why prices" in the first place, and, secondly, "why agricultural land prices?" For these reasons, the chapter will begin by examining prices in general, examining the micro-economics of price determination and some of the fundamental macro-level questions that have to be confronted in dealing with prices as part of broad policy analysis. This discussion at this stage will reveal the important role prices play in forming a bridge between the micro and macro economics of some of the common problems we confront on a daily basis. The importance of agricultural land prices in the investment decision-making process in particular, and farm operations in general will then be explored. The rest of the chapter will then proceed as outlined above.

3.2 Theory and Fundamentals of Price Formation

The importance of prices has been the subject of a vast amount of literature. It is central to the old and broad questions of competition and economic efficiency and how the competitive interactions of demand and supply which affect the pattern of incentives and determine the welfare effects on both producers and consumers (Vickers, 1994). Some of the earliest writings on the subject go back to the time of Adam Smith, David Ricardo, and Alfred Marshall. A fundamental question that has bothered mankind from time immemorial has been the ascription of value to a good or service and how the prices paid

to acquire a good or service relate to the intrinsic value possessed by that particular good or service. People have an interest in knowing whether or not they are paying the true value of the item or are being compelled to pay for something above its opportunity cost/price.

The concept of price formation is fundamental to the study of Economics. The Classical Economists already determined that the value of a commodity is subject to variations (Lord Lauderdale, quoted by David Ricardo, 1817). This means that the value, expressed as a price for the commodity in question, must vary from one time period to the other and for one reason or the other. David Ricardo (1817) himself saw commodities as possessing value according to the utility they provide or the amount of work (measured in units of labour input) required to produce or procure the commodities. While these positions seem to complement rather than oppose each other, they reinforce the necessity to fully understand and describe the process of price determination and price formation, since there is an implication of differences in the sources of variation in value from one period to the other.

Two strands of explanations have generally been proferred in the literature on how the value of a commodity is determined. One explanation builds on the interaction of demand and supply while the other explains commodity prices in terms of the cost of production. In relation to the demand and supply argument, the contention is that it is the "proportion between supply and demand", which in modern terminology implies the relative slopes of the demand and supply curves, that determine the price of a commodity. It is clear from the writings of David Ricardo that there was deep controversy among several classical economists about this subject. From an initial position that cost of production is the main determinant of price, M. Say is reported to have modified his position to accept the demand/supply position, declaring that the "value of every commodity rises always in a direct ratio to the demand, and in an inverse ratio to the supply" (David Ricardo, 1817).

Lord Lauderdale's opinion (presented by David Ricardo, 1817), as already highlighted earlier, supports the notion of the causal relationship between value on one hand and the interaction of demand and supply. According to him, four sets of factors related to the

supply-demand framework can bring about variations in value of a commodity. These are summarized as follows:

- A reduction in quantity (supply) will lead to an increase in value;
- An increase in quantity (supply) will lead to a reduction in value;
- An increase in demand will lead to an increase in value;
- A failure of demand, that is a decrease, will cause value to fall proportionately.

The modern literature on land price determination has drawn from the above notions in an attempt to explain the situation in relation to land prices. The general belief is that because of fixed short-run supply of agricultural land, "price may be assumed to be demand-determined" (Phipps, 1984, p. 423). This means that the factors that determine demand will indirectly influence the price of land. Under normal market conditions, all these factors determine how much a prospective buyer can spend on an asset. But price determination is only achieved when the demand of the buyer interacts with the supply of the asset. An illustration of the interaction of demand and supply curves in the stylized land market of fixed supply of agricultural land is shown in Figure 3.1.

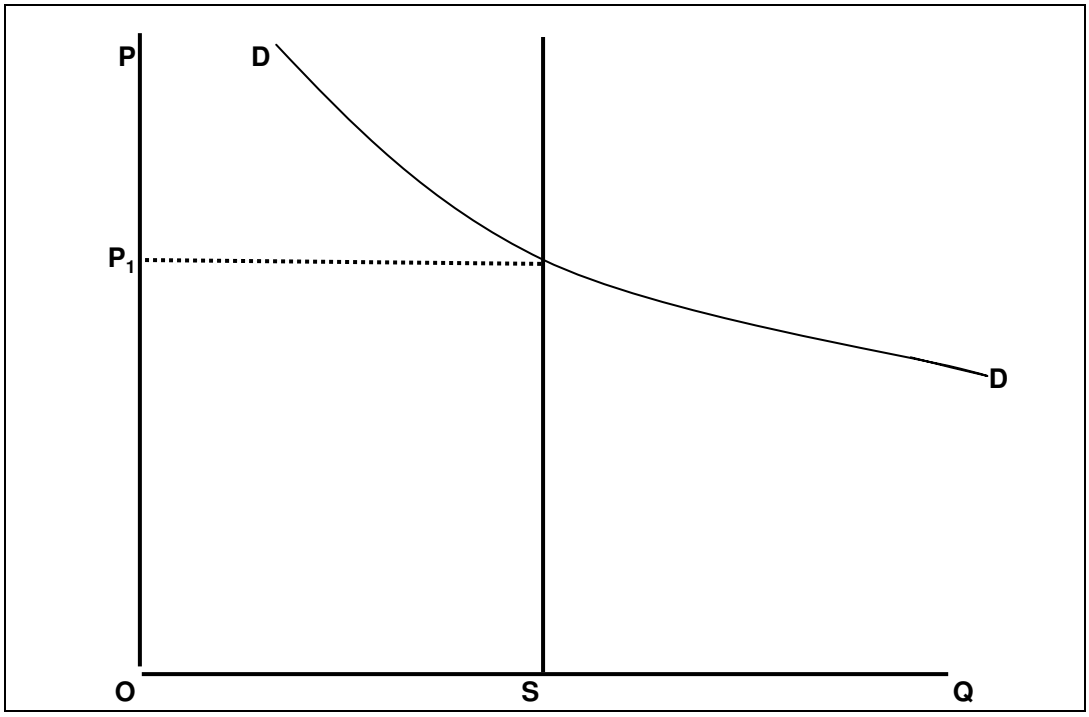

Figure 3.1: Basic conceptualization of supply and demand in land price formation

This is consistent with the notion that it is the "proportion between supply and demand". In this regard, land presents some interesting features which influence our conclusions about the nature of the model to be constructed and estimated. Without question, the stock of agricultural land is essentially fixed in the short run (Phipps, 1984) as Figure 3.1 makes clear. There is no reason to alter this assumption at this stage, moreso as total stock of land available within the South African territory is well known. This is in fact the basis of the land reform programme proposing to transfer 30% of land held by white farmers to black farmers by 2014. This situation has been depicted in Figure 3.1 as a vertical line from the X-axis to represent the short-run supply curve of land. It is obvious from the graph that, as Phipps (1984) predicts, land price is entirely determined by the demand for land. If there is a sudden shock that moves demand upwards to the right, we can expect, as shown in Figure 3.2, that price of land will increase.

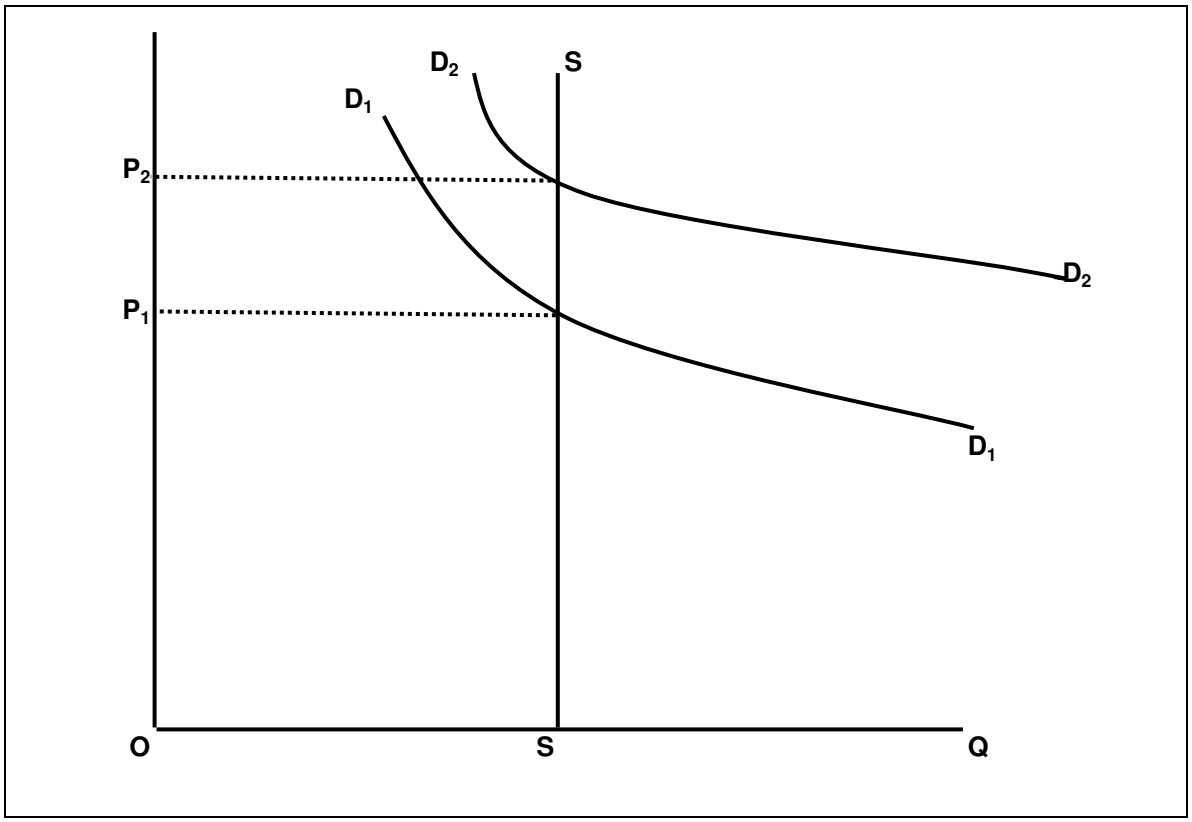

Figure 3.2: Illustration of weight of demand in land prices determination

But David Ricardo, along with many classical economists, considered that whenever demand and supply play a role in price determination, it is only a temporary

phenomenon. Either of the two elements will eventually be altered and price will be returned to its original level or established at a new level from where it was previously. It would seem that the effect of demand and supply is to dislodge price from its equilibrium level to which it quickly returns. According to the classical economists, notably David Ricardo and M. Say (David Ricardo, 1817), cost of production is the ultimate regulator of the price of a commodity. A reduction in the cost of producing the commodity in question will automatically cause its price to fall. The converse will be true if the cost of production increases, leading to an increase in the price of the commodity. Unfortunately, classical literature provides little guide on how the process of price determination works in relation to the cost of production. Production economics and farm management theory in relation to asset acquisition and disposal can however shed some light on how this process can work in practice (Nweke, 1981). Figure 3.3 below has been employed in agricultural production economics to illustrate the process of price determination where asset fixity is present as in the case of land.

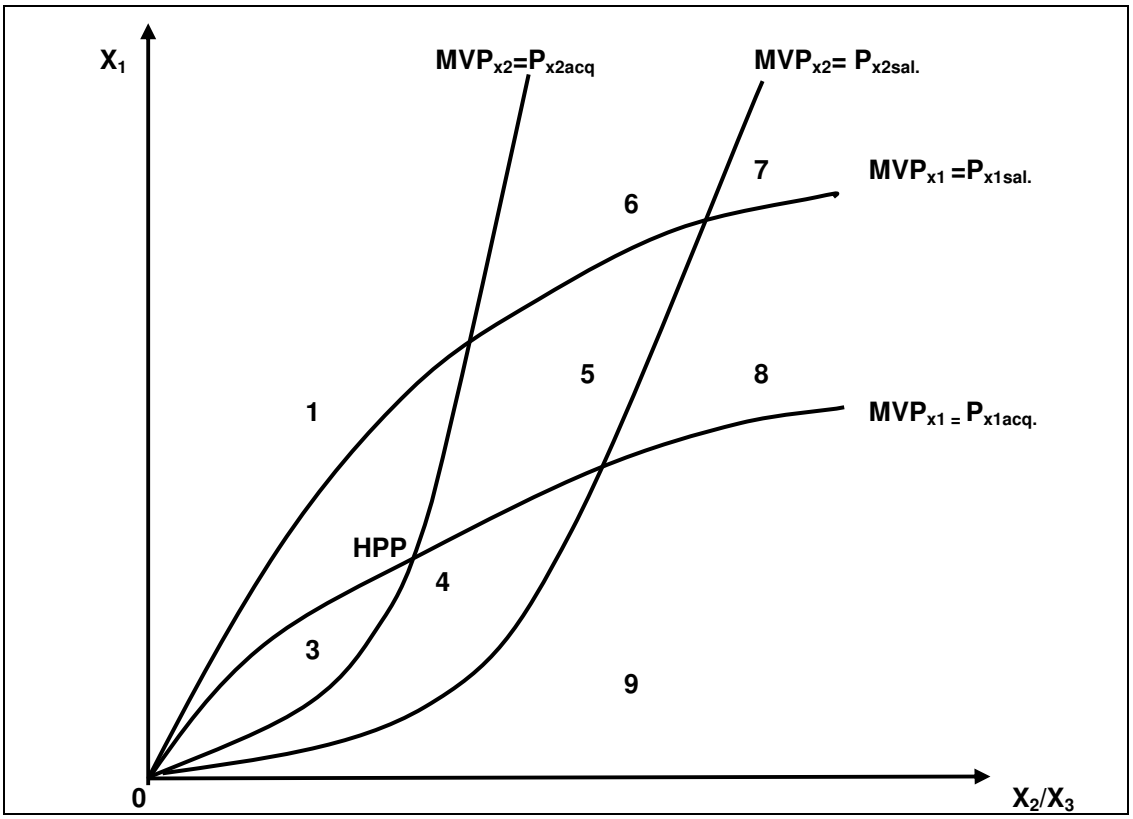

Figure 3.3: The decision process in asiset acquisition and salvage in the presence of fixity based on the notion of production costs

The decision process for acquisition of a parcel of land under a land-supply constrained situation can be illustrated by Figure 3.3 above. The diagram provides an analytical framework for examining the purchase/re-sale decisions of a farm-firm with respect to two factors, X_1 and X_2 when a third factor, X_3 is fixed in supply. The diagram consists of four iso-marginal value product lines which equate marginal value products and acquisition and salvage values when a farmer is faced with the decision problem involving two factors required to produce a single product. The diagram can help to elucidate the impact of demand factors (represented by the variable factors in the diagram) when the supply of the asset is fixed. The components of the diagram can be described as follows:

1. $MVP_{x1} = P_{x1acq.}$, which equates the contribution of factor X_1 to the price at which it is acquired (or bought). If farmers have perfect knowledge as we have assumed under perfect competition, then it will be possible for the farmer to foresee the returns achievable from the purchase of the farmland and move to equate marginal costs (represented by P_{x1acq}) to marginal revenue (represented by MVP_{x1});
2. $MVP_{x1} = P_{x1sal}$, which equates the contribution of factor X_1 to the re-sale price of the factor. The farmer's goal is to maximize profits and at the worst, break-even by equating marginal revenue to salvage value when at least there is no capital loss even if there is no capital gain.
3. $MVP_{x2} = P_{x2acq,}$ which equates the value added by factor X_2 to its acquisition price;
4. $MVP_{x2} = P_{x2sal,}$ which equates the value added by factor X_2 to its salvage value.

The fundamental principle of economics is that the buyer will buy more of the factor if the marginal value product (MVP) exceeds the acquisition price. It will pay to buy more of the factor that will yield more than it costs to acquire it in the first place. The same argument also assumes that the investor will sell some of the factor if the MVP is less than its salvage value. It is getting too costly to hold because it is not producing enough to finance its own replacement.

In order to allow us to analyze the decision process with a little bit more precision, the diagram is examined in terms of the nine (9) areas demarcated by the four iso-marginal value product lines as shown. These areas represent different levels of organization of the farm which have implications for enterprise health. For the farm-firm, these levels of organization have implications for the realization or otherwise of capital gains upon disposal of the farmland in question. Without undue elaboration since all these are very obvious, area 5 represents the region of optimum welfare for the enterprise. Any point on the outer surface of area 5, except the HPP, has an MVP for one of the inputs which is greater than the salvage value but less than the acquisition value, while the MVP of the other input will be equal to either the salvage or acquisition value. In this area therefore, over-production can occur, mistakes can be made but are not likely to be corrected until stocks of both variable factors are exhausted. Capital losses occur with respect to the original acquisition costs of the committed stocks of the factors.

Dornbusch and Fischer (1987), have presented evidence that demand factors alone effectively determine the asset price of housing. Given that their pivotal argument that the stock supply of housing cannot be adjusted quickly in the short-term in response to price changes applies also to agricultural land, their evidence is also valid for the analysis of the determinants of agricultural land prices. Merlo and Rosato (1989) among many others, have shown that agricultural land and housing generally follow the same trends in terms of their behaviour towards inflation, interest rates, and other financial variables. The present model will therefore borrow from their argument the position that:

- The equilibrium asset price of housing is determined by the intersection of the supply and demand curves;
- At any time, the stock supply of housing is fixed, so that the supply curve can be shown as a vertical line, perpendicular to the horizontal axis;
- The demand for the housing stock depends on the net real returns obtained by owning housing;
- When the net returns increase, the demand curve shifts upwards to the right and will cause an increase in the price of housing;

- At any one time, the market for the stock of housing determines the asset price of housing.

3.3 Agricultural Land Prices

According to Gujarati (2003), asset prices normally follow a random walk in the sense that they are subject to periodic swings of a stochastic or random nature. When a number of other actions, both investment-related and policy, are dependent on the levels of such asset prices, it is important to understand what influences them and how they exert their influences. Land prices, especially agricultural land prices, are not any different, and by their very nature, have a diffuse effect in the process of economic management, policy formulation, and interventions to address poverty alleviation through various forms of farm support and advisory services. Resource and production economists have thus been fascinated by this phenomenon, leading to the proliferation of a large body of literature on the subject. The main issues surrounding agricultural land prices and farm valuation have indeed engaged research and policy interest for at least two centuries, predating the early days of the *Journal of Land Economics* which began to publish results of investigations into land value before the end of the first World War.

The main concerns have generally been with the impact of agricultural land prices on farm investments and how this impact is assessed in terms of the methodologies and research procedures. Interest in equity in the distribution of land which has led to the establishment of land reform programmes in many countries across the world compel attention on land prices which are often the most potent instruments for achieving any equilibration in the distribution of scarce resources in a free market. There are therefore good reasons for this seeming preoccupation with agricultural land prices as it were. In the first place, of all the factors of production, land is the least substitutable under existing and readily accessible technologies. Advances in hydroponics technologies have been phenomenal and have moved from small nursery programmes to huge commercial undertakings. The almost ethereal title of a short article: “farming without land” (Rocher, 1998) perhaps aptly captures this interesting development. However, these trends have not made land irrelevant in agriculture. Far from that, hydroponics technology is still

limited to a narrow range of agricultural production activities such as intensive vegetable production and agricultural experimentation schemes for research and training purposes. The scope for applying such technologies to the production of most field crops is therefore quite low at best.

On the other hand, the other factors such as capital and labour can be varied almost infinitely. Hence, it will remain an important pre-occupation of researchers, policymakers and farm managers and development practitioners to try to understand what factors determine access to land for agricultural purposes and the process of price formation in the agricultural land market. The significance of agricultural land price itself has equally commanded considerable attention.

The foremost contributor to the theory on the subject was David Ricardo (1817) cited by Van der Post (1937) who illustrated the relationship between economic rent and land quality as manifested in the fertility of land. The thinking was that the value attached to agricultural land arose largely from what the land can yield in terms of physical output. In turn, the physical output that the land can deliver is determined by its fertility. Highly fertile land would therefore attract higher prices than land endowed with poor soils because the output of the former can fetch more in the market than the output of the latter. This is because land of high fertility will support the production of a larger output which in turn will lead to higher incomes for the farmers. In contrast, poor soils mean that the land is incapable of supporting reasonable levels of output which will be associated with low revenues. The market value of agricultural produce has a direct bearing on the level of incomes farmers can earn from their efforts. In Ricardo's formulation, land prices can be used as an indicator of the quality of the particular land under consideration (Van der Post, 1937).

To better focus this review, we attempt to trace and categorize the major strands of thought on the subject of agricultural land prices. Studies of the factors influencing agricultural land prices have generally followed two main streams or schools of thought. One stream follows the theoretical notions of asset pricing which explain value in terms of supply and demand relations. In this school of thought, the value of an asset is viewed

as the discounted value of all future expected earnings. This approach has actually been derived from standard finance and real estate theory and bears a close relationship to the net present value model popular in the field of natural resource economics (Randall and Castle, 1985). The land in this case is valued mainly in terms of the income that can be obtained from the sale of the products of the farm. Such value can also be imputed on the basis of going market prices in cases where all or some farm produce is not sold.

The farm may also yield other forms of income or benefits that form part and parcel of its attributes to which monetary value can be imputed. The farm, as is well known, serves multiple functions and its value arises from different sources. For instance, the farm is not only a means of livelihoods, it is also a place of abode or habitation for the farm family and farm workers, an object of investment or store of value, as well as a sentimental piece to which people can feel strong attachment as Warren (1913) has aptly described. All these various direct and indirect (including, imputed) incomes and benefits are then capitalized and their present values are worked out on the basis of a reasonable assumption of the expected length of the productive life of the farm and related assets installed.

Van Schalkwyk (1992), cited by Van Schalkwyk (1995), Van Schalkwyk and Groenewald (1993), Peterson (1986), and others have described the procedures for capitalizing the various rewards of a farm as a basis for determining the value of the farmland. As can be expected, the factors that influence farm productivity will have an influence on the value of farmland through their impact on the achievable earnings. Thus, changes in agricultural returns, inflation and real interest rates, capital gains, and debt acquisition, are all assumed to exert some influence on the level of prices of agricultural land. In much the same way, factors that influence demand for, and supply of, land will, through their impacts on the slopes of the curves, determine the variations in the price of land.

The other school of thought puts considerable stress on non-agricultural factors associated with the land. This approach adopts the ad hoc revealed preference perspective. The main theoretical foundations for these approaches are based on the

hedonic pricing models which generally employ the attributes of land to ascribe value to it. To that extent, this perspective is an off-shoot of the Ricardian viewpoint that gives high weight to land quality as a significant factor influencing land prices. In this approach, such elements as the location of the land in relation to major landmarks and services, distance to social services, urban centres, or highways, receive a lot of attention in much the same way as soil fertility and other soil and site characteristics. It is considered that the proneness of the land to such phenomena as erosion, etc have important practical implications for fertility and other soil and land characteristics which have a bearing on the quality of the land and its ability to support a profitable agricultural enterprise.

The literature review undertaken in this chapter will examine the subject matter in greater detail with respect to the foregoing issues. A comprehensive review of the theoretical and modeling aspects of land price determination will be carried out. The specific methodologies adopted in each case will be detailed along with their policy implications. An attempt will be made to distinguish between the broader international evidence and literature specific to South Africa. While the process of price formation may be fundamentally the same regardless of physical and geographic setting, there could no doubt be some location-specific influences which play an important role. Both for interventions to deal with asset distribution such as in land reform programmes, and broader issues of policy formulation, such locational differences deserve special attention.

The nature of land and the multiple uses to which it can be put and the complex relationships it generates perhaps make it one of the most difficult assets to value. For one thing, land cannot be moved from one point to the other. Therefore, it is not possible to move it from a land-surplus area to a land-deficit area in search of better prices. In and of itself, land has limited market value outside the specific purpose for which it is desired. Thus, land is either valued for its agricultural end-use or for housing development, or construction of recreation facilities, etc. Each of these uses determines how much a person or institution is willing to pay for a piece of land. According to Ely and Wehrwein (1964), land cannot function as a factor of production until some

investment has been made on it to transform it from a physical entity to something that can yield material value to satisfy human wants and needs.

Given the importance of land, there is a lot of interest in how its price is determined and how its price in turn influences other aspects of the economy. A substantial body of literature therefore exists on these issues and we will attempt to review them in this section. To begin, we revisit the earlier ideas concerning the strands of thoughts on agricultural land price determination. As indicated earlier, one strand adopts the asset-pricing concept which considers the time-value of money and is based on several classical theories, including those explaining capital accumulation, investment, etc. For purposes of farmland price determination, the traditional capital theory provides a basic theoretical underpinning (Van Schalkwyk, 1995). This theory was developed largely on the basis of the seminal work of Fisher (1930) but has gone through substantial refinements in the light of applied research mostly in the United States. In the next several sections, an attempt will be made to review some of these researches in order to contribute to the explanation of the determinants of farmland price variations.

3.3.1 Factors Influencing Variations in Farmland Prices

Most of the research on farmland values has focused on the question of what determines them and accounts for their variation over time and from one location to the other. Some of the most commonly discussed factors include net farm income, inflation rate, interest rates, population growth, land productivity and land quality, etc. According to Awokuse and Duke (2004), there are four categories of explanatory variables, namely:

- measures of government programmes,
- measures of net return to agriculture,
- measures of land quantity, and
- measures of financial (credit market constraints) and/or macroeconomic activity.

Measures of government programmes include the quantifiable interventions which government introduces to achieve re-distribution of land within the society where a

history of maldistribution or inequity has become a serious political and moral issue. In the South African context, the most significant intervention in the land market over the past decade has been the land reform programme. Strategies adopted within the framework of this programme include various categories of payments designed to facilitate the acquisition of land by the new black entrants into the farming business and enable them establish as commercial farmers. The cash grants made to eligible individuals fall in this category. Subsidies on inputs and other forms of farm support also feature under this category of factors influencing agricultural land prices.

Measures of net returns to agriculture are clearly important determinants of agricultural land prices where land is demanded for its productive use in agriculture (Trivelli, 1997; Pyykkonen, 2006). In general, these measures will include the income earned from the operations of the farm. An important measure in this class is the net farm income. In places where a land rental market exists, land rent can be considered an agricultural return that accrues to the farmer upon the disposal of the land. It is also possible to consider total value of agricultural production although this will not precisely measure the income accruing to the farmer since it is inclusive of the cost of production which has be to be deducted in order to derive an accurate measure of what the farm returns to the operator.

Measures of land quality are those attributes that can be quantified and employed in describing the relative productive power of the land (Peterson, 1986). Indices can be constructed which show the level of fertility of the particular piece of land under consideration (Van Schalkwyk and Groenewald, 1993). The amount of acidity or alkalinity, as well as levels of important plant nutrients in the soil are also important attributes which hold considerable interest for the farmer who is considering the purchase of a piece of land. Such attributes are important in placing value on the particular piece of land in question. Equally important are locational factors. For instance, when two pieces of land of comparable fertility status are under consideration, the one that is more proximal to market centres or sources of important farm inputs, is obviously of higher quality than the other. In the same way, the standard of physical and economic infrastructure, such as roads, bridges, stalls, storage facilities, financial institutions, etc,

serving a particular farming area play a crucial role in determining the price of land. These attributes can be used to construct indices and incorporated into a model to determine the pattern of relationships between a set of explanatory variables and farmland prices.

Measures of financial and/or macroeconomic activity are commonly designed to provide insights into the level of economic activity in the country. Fiscal and monetary policies are based on these measures and there are statutory bodies charged with the tasks of enacting and implementing the relevant policies. These policies exercise their major impacts on demand which in turn influences the level of prices offered to purchase land. One important way demand can be regulated is through the degree of constraints imposed on credit availability. This can either be by the raising or lowering of interest rates, or prescribing qualifying criteria for credit, setting ceilings on the maximum allowable credit, etc. Another way government can influence or regulate macroeconomic activity is by the imposition of various forms of taxes. As would be discussed presently, the issue of the rural land tax has been a subject of long-standing debate in South Africa, especially in terms of how it will influence agricultural land prices and the on-going land reform process.

In the next several sections, the specific roles of these measures in determining land prices will be discussed and the literature on the methodologies employed to ascertain these will be reviewed. With respect to South Africa's specific experience, the review will examine the dominant research going back to the early 20th Century and see how both the motivations and methodologies have evolved over the years. Such review will be important in throwing some light on the theoretical foundations of the history of land policies in South Africa as we know them and what role that resource has played in the socio-political life of the country. One of the most significant policy initiatives of the present era is the land reform programme. By examining the trend in farmland prices and what have been the major factors influencing them, it may be possible to gain deeper understanding of the constraints faced by the on-going land reform programme and how these are expected to affect its eventual outcome.

Figure 3.4 is an attempt to group these various factors into broad categories and present a stylized view of the relationships among them. As is obvious from the figure, a clear distinction can be made between agricultural and non-agricultural factors. In the same way, macroeconomic factors, particularly those identified as regulating the rhythm of the economy as a whole through their effects on demand, credit availability, etc, can be distinguished from the other factors. How these various factors influence land prices has also been quite widely investigated. In a study conducted for the Food and Agriculture Organisation of the United Nations (FAO), Trivelli (1997) obtained results that allowed for a number of expected relationships to be hypothesized as shown in Table 3.1. The next several sections will provide more detailed discussions on these factors and how their specific impacts are exerted.

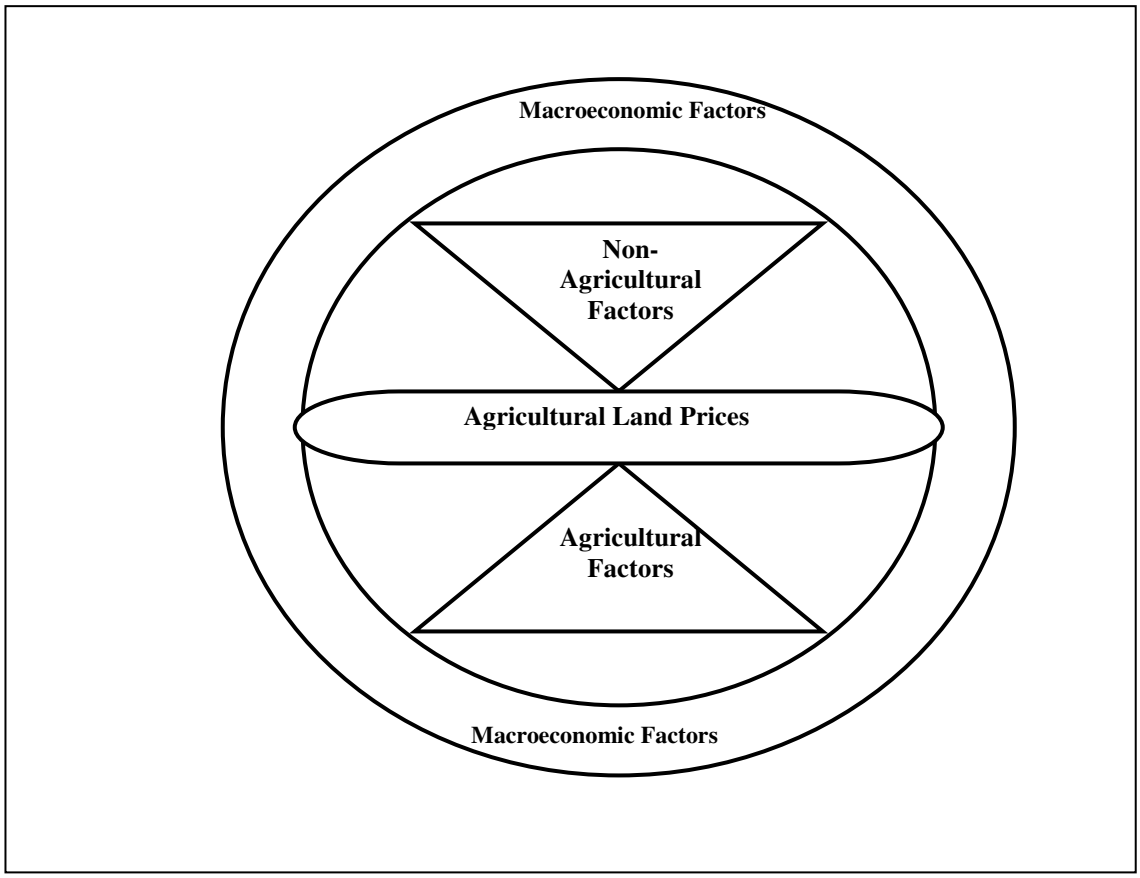

Figure 3.4: Factors influencing farmland prices

Table 3.1: Expected Effects of Different Variables on Farmland Prices

Expected Effects on Land Prices		
Changes in: (other things constant)	**Expected Effect on Land Prices**	**Main reason**
Increases in output prices	+	Increases the VMP of land
Increases in input prices	? (-)	Depends on the effect on output prices
Increases in the output/input price ratio	+	Increases the VMP of land
Technological change	+	Increases production per unit of land (VMP increases)
Soil conservation programs	? (+)	Depends on the capitalization of the soil conservation, that could be a function of the initial degree of soil problems
Increase of subsidies for agricultural production	+	Assuming subsidies have real impact on production costs, they increase the VMP
Increase in transaction costs in the output or input market	-	Decreases the real net rent received by the tenant/landowner
Increase in landowners fix costs (depreciation, maintenance costs)	-	Reduces the net rent that could be obtained from land. Also induces renting instead of buying.
Increase in searching, bargaining and transfer costs in the land market	-	Reduces the net rents that could be obtained from land. Also induces renting instead of buying.
Property taxes	? (-)	Represents an increase in owners costs but the effect depends on the relation between the taxes and inflation, and on the type of taxes.
Income taxes	? (-)	Reduces the net land rents, but it depends on the relation with inflation.
Inflation	+	Double effect. Speculative, increases attractiveness of land as asset (store of wealth) and, depending on the effect on real output prices, could affect demand (VMP)
Increases in real interest rate	-	Changes the opportunity cost of investments, makes more attractive other sectors.
Increase in expected future capital gains	+	The effect could be seen in two cases. With perfect information the expected gains tend to be real gains then price bubbles could be observed. With less information, more speculative movements and price overreaction.
Reducing fixed zonifications (agricultural land/urban)	? (+)	Breaking up fixed zonifications tends to open the market . The final effect will depend on what alternative uses for land come to be relevant.
Credit programs to buy land	+	More demand for a fixed or quasi fixed asset supply
Population growth	+	More demand for agricultural output (more demand) and more demand for space.
Government programs	? (+)	Depends on the program, but usually the possibility of capitalizing government benefits increases the capital gains (subsidies, etc.)

Source: Trivelli, C. (1997), "Agricultural Land Prices", SD Dimensions, Rome, FAO

3.3.1.1 Measures of Government Programmes

As has been mentioned in the previous chapter, the South African government is implementing one of the boldest land reform programmes anywhere in the world, which is aiming to transfer a total of 30% of white-held land to black ownership by 2014 (DoA/DLA, 2005). Setting such a target derives from a realization of the long-term consequences of the history of extreme deprivation of the black population. The present government is therefore trying to do whatever is necessary to right the wrongs of the past especially through explicit "affirmative action" principles which the black population is explicitly targeted with measures that move them more towards the mainstream of the economic life of the country. It has been necessary to introduce many radical policy measures in order to achieve this goal.

One of the key strategies introduced at the inception of the land reform programme was the provision of cash grants designed to enable black emerging farmers acquire land and establish commercial farm enterprises under the land redistribution programme known as the Land Redistribution and Agricultural Development programme, (LRAD). When the programme was launched, the cash grant was set at R15,000 per beneficiary household. Later on it was adjusted to R16,000. Under the scheme, then known as Settlement/Land Acquisition Grant (SLAG), the grant targeted previously disadvantaged individuals (PDI's) who were landless and poor (Lyne and Darroch, 2003). At present, these cash grants range from R20,000 to R100,000 per recipient depending on a number of criteria. Government's total budget for 2005/2006 for the cash grants is estimated at about R2 billion.

For decades, South African researchers have shown interest in land prices and their importance. Evidence from South Africa supports the international observation that farmland price changes have important impacts on farm production and finance. Farmland and improvement accounted for approximately 78% of South African commercial farmers' total assets in 1976 (Van Schalkwyk, 1995). By 1993, this figure had declined to 67% (Directorate of Agricultural Economics Trends, 1995). The financial stress in which many producers sometimes find themselves can therefore often be

attributed to falling land prices which reduce farmers' net worth and curtail the borrowing power of the farm business.

Rising farmland prices have, in and of themselves, attracted considerable attention. From the late 1920s to the early 1930s, South African agricultural land prices exhibited a high degree of volatility, mostly trending upwards over the medium to long-term. Many economists actually suppose that government intervention in the agricultural sector to stabilize farm prices and farmer incomes have helped to raise agricultural land prices in many instances. For instance, Grosskopf (1932), cited by Van Schalkwyk (1995), observed that agricultural land prices showed significant increases because of an unusually good performance of the farm sector during that period. These increases were obviously unusual and set off an alarm in 1929 that land prices in many districts were nudging above what was then termed "safe" levels. But this phenomenon seemed to have established agricultural land as a "very valuable and exchangeable" factor of production whose impact on the farmer's balance sheet is overwhelming (Van der Post, 1937).

During the following decade, researchers were concerned over the steady increase in land prices that peaked about 1945 and were not accompanied by a corresponding increase in product prices (Tomlinson, 1945; Tomlinson, 1946). These unrelenting increases continued for the next couple of decades. As Behrmann and Collett (1970) revealed, South African farmland prices trended significantly upwards over the period 1939-1960. We shall examine the key findings of research with respect to these factors.

3.3.1.2 Measures of Net Returns to Agriculture

As clarified above, these measures should include such variables as farm incomes, total value of farm production, land rent, etc. They provide information on what the farm can yield and thus serve as the determinant of how much a prospective investor is willing to pay for it. The various components of these measures are examined in turn.

3.3.1.2.1 Farm Incomes

Since the value of a piece of land has generally been associated with the output it can generate, the influence of farm incomes has received a lot of attention. Land is commonly priced according to what it can yield. The fundamental assumption is that land yields benefits in perpetuity and the procedure is usually to discount the streams of future benefits to their present value in order to determine their worth today in the market. The most outstanding studies in this respect began in the United States during the latter part of the 1950s and employed data going as far back as the 1920s to establish the links between net farm income or farm returns and the value of agricultural lands. The earliest study in this genre was conducted by Renshaw (1957) who examined US farm data for the period between 1920 and 1953 and found a positive correlation between gross farm income and farmland values.

Using cross-sectional data over three distinct time period, 1936-1940, 1951-1953, and 1961-1963, spanning about 27 years, Scofield (1964) confirmed that net farm incomes explained a large part of the variations in farmland values across states in the United States of America. Reynolds and Timmons (1969) arrived at the same conclusions in establishing that the larger the stream of expected future benefits from a given piece of land the higher the expected present value of the particular piece of land. As is already well known, current market prices relate quite closely to the net present value of the asset.

Still working in the United States, Gertel (1988) found that net farm returns bear a very close relationship to farmland prices although such relationships were stronger when using regional data than when the data are aggregated at the national level. Gertel (1988) attempted to explain this tendency in terms of the aggregation problem associated with using data from hugely different regional settings which may create serious distortions especially where there are several non-farm factors implicated in land price determination. On the basis of new research, Gertel (1990) has been able to establish that a host of these non-farm factors such as interest rates and inflation also play an important role in the setting of the values of farmland.

In their study, Chavas and Shumway (1982) amplified these findings and went further to examine earlier models that considered net returns, average farm size, number of transfers, expected capital gains, etc. Their conclusion was that the most important determinants of the observed increases in farmland prices were changes in the prices of the major farm commodities produced in the study area, technological progress, land quality or fertility as reflected by the "corn suitability ratings" provided by crop and soil scientists, and possibly input prices, urban pressures, etc.

Having established the net farm income causation, attention began to shift to what measure of farm income best mirrors the value of agricultural land. According to Melichar (1979), net farm income may not be an appropriate measure of the returns to land. In fact, Melichar (1979) expressed strong reservations about the validity of the net farm income measure because when used to attempt an explanation of the variations in land prices, very wide divergences are observed. His view was supported by Reinsel and Reinsel (1979) who agreed that the use of net farm income per se was erroneous. The alternative suggested by these researchers is to compare real capital gain generated by farm assets with the current returns arising from these assets (Melichar, 1979). The quest has been for what constitutes the "pure" returns to land which will provide a good basis for valuing land in agriculture. A number of studies conducted in the 1990s have employed net rents or residual returns to land to approximate the rent.

Incidentally, such approximations using net rents are only feasible in the United States where the land rental market is better developed (Oltmer and Florax, 2001). In many studies outside the United States, researchers use the cash rent to mirror farm income. Nieuwoudt (1987) used the cash rent to explain variations in the land prices in South Africa and established a ratio of about 5% between cash rent and land values. Gunjal et al. (1996) in their studies in Canada, have employed a mixture of cash rent, farm income, or gross farm income. Some studies make use of agricultural production value or market value which is derived by multiplying the physical total product by the average price (Oltmer and Florax, 2001).

3.3.1.2.2 Effect of Land Productivity

Despite the seeming failure of earlier theories of market determinism to explain adequately the rising land prices, it remains a dominant theoretical platform for the analysis of agricultural land prices. In more recent times, researchers have looked more widely, examining factors within and outside the farm sector to explain the observed trends and tendencies in farm land prices. A certain consensus has emerged that a complex set of factors interact in the land market to determine the value of agricultural land. In an analysis of 63 Missouri farm sales in 1970, Blase and Hesemann (1973a and 1973b) identified productivity and immediate costs of procurement of land as the most important determinants of land prices, out of a long list of explanatory variables which included proportion of land suitable for row crops, age of barn, size of barn, distance to nearest large city, size of farm, amount of initial down payment required to close sale, proportions of land under pasture and under other uses including waste and timber, number of similar farms for sale, reason for farm purchase, etc.

Two other studies that were looking at interesting trends of farm land prices in the United States of America in the 1970s were reviewed, namely Jennings and Kletke (1977) and Pope *et al*. (1979). In the former case, Jennings and Kletke (1977) carried out a regression study based on cross-sectional data on 913 farm sales in four counties of North Central Oklahoma (United States), and showed that farmland productivity was important, among 13 other variables. In fact, the analysis showed that, out of the 14 explanatory variables assessed, quality of crop land was second in importance in explaining the variations in farmland prices.

In their own study, Pope *et al.* (1979) considered a set of farm and non-farm factors, including farm incomes, public sector commodity programmes, financial instruments, and the role of various macroeconomic forces. Although their main concern was to compare alternative econometric models in predicting farmland prices, they concluded that these factors are contributory determinants. Their most significant finding, however, was that the land market was becoming more complex than previously as a result of structural changes that had been taking place over time.

3.3.1.3 Measures of Land Quality

As highlighted earlier, these are measures of the relative productive power of the land which (Peterson, 1986). The measure of land quality used in any particular context will depend on the use to which the land is to be put (Peterson, 1986). For agricultural land use, it is common to consider fertility measures, including those that relate to investments in land improvements, moisture content, etc. Indices constructed on the basis of this information can be included in a regression to determine the extent to which variations in farmland prices can be traced to differences in land quality. Studies conducted in different parts of the world, including the United States and South Africa (Peterson, 1986; Van Schalkwyk and Groenewald, 1993) suggest that land quality can be an important consideration, especially where regional differences are to be determined.

3.3.1.4 Measures of Macroeconomic Activity

Within this group we include all those factors which influence the macroeconomic environment one way or the other. These are mostly the macro aggreagates whose actions essentially regulate the "heartbeat" of the nation and directly or indirectly influence the level of prices in the economy. These will be discussed in turn.

3.3.1.4.1 Population Growth

An early attempt by the classical theorists, notably Alfred Marshall, to explain the movements of agricultural land prices gave a lot of prominence to the impact of population growth and the demand for agricultural commodities. According to Alfred Marshall, the "site value is expected to rise in consequence of a growth in population". According to these early thinkers, population growth would lead to an expansion in the demand for agricultural products such as food to feed more mouths, clothing, and other products of the farm. In turn, this would lead to an increase in the price of agricultural land given its fixity. Mertzke (1926) observed that the tendency for land values and population to move together is a common phenomenon. Such an increase in the price of land would arise from an increase in the demand for land to meet the rising demand for

agricultural products. For one thing, population growth has led to phenomenal growth in demand for agricultural products. However, technological progress taking place at the same time has meant that unit costs of production have fallen dramatically, leading to unexpected high levels of productivity.

Thus, it has not been necessary to increase proportionately the quantity of land in service in order to meet the increased demand for agricultural goods and services produced by the land. In fact, it would seem that productivity increases have been so large that less and less land is required to produce the same level of output from one generation to another. So, rising commodity demand has not translated into rising demand for agricultural land because technological progress has made land more productive than was previously imagined. This latter point is taken up later under the section on "technological advance".

3.3.1.4.2 Interest Rates

A number of macroeconomic variables are given high prominence in the explanation of the variations in farmland prices. Interest rates as an important macro price determining accessibility to farm credit, has received a lot of attention in the literature. Monke and Pearson (1989) describe interest rates as the price paid for the use of capital. It is a tool/instrument for credit and monetary control used by the national monetary authorities to regulate the level of macro-economic activity in the country. It is used to regulate the level of money supply which influences a large number of other phenomena, including inflation rate. To that extent, it plays a role in determining how much credit prospective farm investors can obtain to spend on land purchase and ancillary farm inputs. In the initial investment for the establishment of a farm business, this factor must definitely play an important role because capital is needed for the necessary establishment costs. An important part of the establishment costs in agriculture is no doubt the procurement of land.

Capital is expected to influence the price of agricultural land in a number of ways. New entrants into the farm business need capital to purchase or rent land. Capital is also

needed to invest in the ancillary activities that drive the farm business. When the investor can acquire the necessary capital for these various needs, s/he is able to make the decision more confidently. More capital means more cash and purchasing power which is expected to enhance the ability to pay and raise the price that investors are ready to pay for new agricultural land.

Drescher *et al.,* (2001) have provided recent evidence of the significance of credit availability in the determination of farmland prices. The large number of studies they reviewed in the United States included interest rates among a long list of other determinants which also featured farm returns, farm size, expected capital gains, and capitalized policy benefits. The implication is that where land purchase is to be financed from borrowed funds, the cheaper the funds the more people can borrow and the more the price they are ready and able to pay for the land. Hanson (1999) has also shown that interest rates are very crucial especially in the application of some of the most common models of farmland pricing such as the present value model.

3.3.1.4.3 Exchange Rates

In simple terms, this is the price of foreign exchange or foreign currency in terms of the local currency (Monke and Pearson, 1989). The foreign exchange rate plays a very important role in the importation of inputs and in the exportation of the produce of the farm where agricultural surplus is sizeable. To this extent, it has an important role in farm profitability which in turn affects the decision to invest or divest. For this reason, the literature has given it a fair bit of attention. Exchange rate falls within the measures of macroeconomic activity which define the value of the domestic currency and the health of the economy.

A number of empirical studies have shown that a wide range of macro-economic variables, of which foreign exchange rates are a part, influence farm incomes, among other influences. The farm incomes are generally capitalized into farm land prices. To that extent, foreign exchange rates are seen to be quite crucial macro-prices whose effects go to the heart of the country's economic life. The exchange rate regime also influences

the level of domestic prices. Some of these domestic prices include interest rate, that is the cost of capital, and the cost of labour, or wage rates. The level of the exchange rates also influence the cost of capital directly. Studies conducted by Alston, (1986), Burt (1986), and Phipps, (1982), reveal that a fall in interest rates will generally lead to increases in farmland prices, probably because prospective landowners are able to obtain cheap loans with which to finance the purchase of land.

3.3.1.4.4 Inflation Rates

Inflation rate is another macroeconomic factor that has been considered to a large extent in the literature on land prices. According to Awokuse and Duke (2004), inflation rates are one of the variables that measure the level of macroeconomic activity and play an important role in the determination of the prices paid for land for agricultural purposes. Studies done in the United States and elsewhere have demonstrated a strong link between general price inflation and the price of agricultural land. The most notable of these studies can be divided into those studies that emphasize the direct effect of inflation on the relative prices of agricultural land, and those that relate the inflation rate to increases in both returns and interest rates. Feldstein (1979; 1980a; and 1980b) has shown that the rate of inflation directly influences the prices of assets in general. When the rate of inflation is not changing, asset prices generally remain constant and unchanging.

The other category of effects includes those where the inflation rate acts through its influence on farm returns and interest rates. The consensus is that the effect of inflation is ambiguous (Alston, 1984). A regression model used to attempt an explanation of the variations in international land prices showed that there is possibly a negative inflation effect on real land prices although this may be comparatively small (Alston, 1984). Similar conclusions had been made in the context of the Darby hypothesis in relation to the effect of inflation on interest rates. Alston (1986), Burt (1986a), and Phipps (1982), have all conducted research that showed that when both farm returns and interest rates rise by the level of the rate of inflation, real land prices will also rise proportionately. Without question, rising inflation rates will affect input prices and push production costs up. If output prices are also rising, then profit levels will either remain unchanged or

increase proportionately depending on the rate of change of output prices. If the indication provided by input and output prices is that farm returns are looking good, there will be a tendency for increased farm investments to raise the demand for agricultural land among other production factors and consequently lead to higher land prices. In such a situation, it is much more difficult to isolate the effect of either the rate of inflation or interest rate on debt. But in general, it would seem that land may not be a good "hedge" against inflation (Alston, 1984).

3.3.1.4.5 Capital Gains, Capital Gains Tax and Rural Land Tax

The impact of capital gains on the variations in farmland prices has received considerable attention in the literature. It is considered one of the deciding factors in the decision of an investor to buy or not to buy a given piece of land for farming, that is, whether or not it will appreciate in value over time and lead to capital gains or otherwise (Warren, 1913; Van Schalkwyk, 1995). Both popular and more technical literature have given attention to the subject in an attempt to provide clearer meaning to the concept which, by its very nature, concerns a large number of relatively non-technical persons for whom a lot of confusion often exists. Variously, capital gains have been defined as "profits reflecting increased values of ….capital assets" (CTJ, undated), or that "capital gain is the amount of money you make on an investment when it is sold", and that "it is the difference between the money you sell it for and the money you paid for it " (Precision Information, 2005)

It has been suggested that farmland capital gains may reduce incentives to adopt land saving practices and technologies. This may help to explain the increase in farm size, the use of larger machinery, and the relatively slow growth of productivity (Castle and Hoch, 1982). It has also been hypothesized that farm expansion and capital gains are related because the appreciated value of land holdings provides a base for additional purchases (Lins and Duncan, 1980) – the impact of farmland capital gains on farm financing goes beyond increasing the borrowing capacity of the farmer. Van Schalkwyk *et al* (1992) suggest that rising farmland prices encourage greater reliance on debt financing; in an

attempt to reap the benefits of capital gains, farmers buy sooner and incur larger debts than they would do in a stable price environment.

When land values appreciate, farmers' incomes rise proportionately, even if not in direct cash terms. It is considered that capital gains are treated a good deal more favourably than other forms of income because they are not taxed until they are realized. By keeping track of the price trends for the capital assets, the owner of the asset knows how the capital gains are trending. According to Van Schalkwyk (1995), the expectation of upward trending of farmland values, that is rising capital gains, motivates more and more people to demand land as a store of value rather than other assets. Such increased demand for farmland will be expected to put an upward pressure on farmland prices as fewer land will be available on the market (Van Schalkwyk, 1995).

It will be reasonable to expect that farmers whose farmlands are appreciating in value will tend to hold on to them rather than dispose them. At the same time, prospective investors become aware of rising capital gains and wish to buy more land to cash in on the good times. Thus, a supply squeeze alongside increasing demand (excess demand) will lead to rising farmland prices, *ceteris paribus*. It has also been suggested that landowners may have an incentive to hold their wealth in the form of farmland rather than other assets since the incremental income arising from owning land (due to capital gains) were not taxed in South Africa until a few years ago (Reynolds and Timmons, 1969; Van Schalkwyk, 1995; Katz Commission, 1998; Aida International, 2005). However, since 2001, the Capital Gains Tax Act of 2001 has been enacted. This Act came into effect on 1 October, 2001. In terms of the Act, agricultural property larger than 2 ha is subject to the Capital Gains Tax (CGT).

Introduction of the Capital Gains Tax in South Africa had been actively debated for a long time. In 1969, a commission known as the Franzsen Commission was set up to investigate this question and its proposal was for the introduction of a limited form of capital gains tax which would focus mainly on immovable property and marketable assets (National Treasury, 2001). Later in 1986, the Margo Commission ruled against the taxing of capital gains in South Africa. The most recent commission on the subject was the Katz

Commission whose report was submitted in 1998. The Katz Commission saw the whole idea of taxing capital gains in South Africa as a cumbersome and complicated matter and was therefore reluctant to recommend one way or the other (National Treasury, 2001). But with the end of Apartheid Rule and the emerging and growing need for addressing equity issues in the country more decisively and boldly, government continued to examine the matter, including inviting expert advisory missions from the International Monetary Fund (IMF, 2000).

In arguing for the introduction of the tax as part of the recommendations of a mission in 2000, an IMF team noted that the country ranked among the most unequal in the world in terms of income disparities, with an income Gini coefficient of 0.61, surpassed only by Brazil among middle-income countries (IMF, 2000). The mission also noted that the Johannesburg Stock Exchange (JSE) was the 18th largest in the world while the South African Futures Exchange (SAFEX) was the 16th largest in the world (IMF, 2000). Evidently, the economy has a well-developed financial market with strong capital formation indices. The introduction of the Capital Gains Tax was therefore seen as a way of enabling the government attain its equity objectives by ensuring that the wealthy capital owners paid their fair share of taxes (IMF, 2000; National Treasury, 2001).

From the foregoing attributes of capital gains, it has been identified as a very important variable from the standpoint of land price formation. Essentially, it represents the increase in the value of the land due to rising market prices for land. For instance, if after purchase of the land at a particular price the land value increases, this would imply that the land attracts a higher re-sale price than its acquisition price. This represents a capital gain for the farm. When a particular farm is known to have experienced capital gains in the past, the expectation is usually that such gains would continue into the future and become a basis for its pricing should resale be under consideration. The knowledge that farmland is subject to capital gains in a locality creates a huge demand for land which will tend to bid prices up.

At the same time, landowners are less enthusiastic to part with land that is accounting for capital gains, thus reducing the quantity of land on offer for sale, equally putting an

upward pressure on land prices. According to Melichar and Sayre (1977), capital gains are calculated by deducting the total net investment and net transfers from the annual change in the value of physical assets to obtain the nominal capital gains. Real Estate investment advisors say that you measure capital gains by "the difference between the amount realized in the sale and the basis in the asset sold". Of course, a number of other minor costs must be taken into account when disposing a capital asset, such as the brokerage commission and other transfer charges. The final value realized after all these charges have been accounted for will represent the capital gain. The real values are then obtained from these nominal values by price deflation. In the past studies reviewed, the real value of the capital gains is included in the model as an explanatory variable.

Despite the overwhelming evidence that land tax and capital gains (including taxes on them) influence land prices, not many researchers are excited about them enough to include them in a model. Burt (1986) asserts that land taxes are not required to be included in a model as explanatory or independent variables. One of the reasons for this position is that several loopholes exist which create opportunities for tax avoidance or postponement. So, the fact that explicit tax legislation exists does not mean that tax will be paid, making its analysis a mere academic exercise (Burt, 1986). In their own analysis, Lloyd, Rayner and Orme (1991) suggest that taxes and tax rates may actually have only "second-order effects" on real agricultural land prices, drawing support from Alston's (1986) view that differences in tax regimes among countries did not explain adequately differences in the growth rates of land prices among them. It would seem however that the decision to include or not to include various forms of taxes in a model of land prices will depend on what needs to be evaluated and what specific policy environment is being studied.

3.3.2 Other Factors Influencing Agricultural Land Prices

This review would be incomplete if it limits the assessment of prior impressions and viewpoints on this subject to already published works. It is therefore the intention to mention the huge groundswell of popular conceptions that have been emerging within and around South Africa on the subject, especially in the light of perceptions of recent

increases in the prices of agricultural land in the country. Most of these opinions are aired at conferences and seminars and meetings and are also reported in the popular press. These views focus on three main areas, namely the impact of foreign buyers on the local land market, the growing use of land for non-agricultural purposes, and the alleged collusion between buyers and sellers to abnormally raise prices above market-related levels in order to compensate officials who facilitate the transfer/re-distribution process. Each of these issues will be briefly highlighted in the next few sub-sections.

3.3.2.1 Impact of Foreign Buyers

A growing body of popular writings, especially on the internet, is pointing to the rising interest in South African property market for foreign buyers of property. One indication that this trend represents a lucrative business opportunity for local property agencies is the extensive advertising that they are undertaking on sites that attract sizeable foreign readerships. The local property agencies are evidently cashing in on this trend to advertise their services on the internet, targeting foreign buyers who are promised all kinds of assistance and facilitation. These services are available for both residential property and agricultural property (Seeff Properties, 2004). But it does not seem that everybody is happy with the trend.

According to Property24.Com (2005), the Minister of Agriculture and Land Affairs, Thoko Didiza commissioned a panel to investigate the issue of foreign ownership of property in South Africa. The panel had been set up in the wake of an astronomical rise in prices of residential property in the course of 2004 when it was observed that, in many major cities, property prices were going up by more than 30% (National Association of Realtors, 2005; Property24.Com, 2005). Despite indications that the rate of property price increase has slowed somewhat, to about 28% in the first quarter of 2005, and 17.6% in September 2005 (ABSA, 2005), there are still concerns that average South Africans are unable to afford the high property prices. The available data report on house prices and not farmland prices. However, indications are that the one mirrors the other as they have been moving together over the years, although note must be taken that some variables affecting them may differ in some cases.

As to the driving force behind the rising flood of foreign buyers into the South African property market, a number of opinions and viewpoints are on offer. According to the National Association of Realtors (2005), the majority of foreign buyers, an estimated 60%, come from the United Kingdom, with the rest coming from Germany, Zimbabwe, and the United States. In many of these countries, average incomes are higher than they are in South Africa. According to Aida National Franchises (2002), the foreign buyers coming from the above-mentioned countries earn considerably more than persons in comparable socioeconomic groups in South Africa. For instance, the organization used results generated by Delloite & Touche Human Capital Corporation on the basis of purchasing power parity (PPP) index and found that South African Chief Executive Officers (CEOs) earn about half of what their counterparts in Britain and the United States are paid (Aida National Franchises, 2002). As a result, it is easier for these foreign buyers to afford property in South Africa.

The commentaries and reports of similar investigations also refer to the exchange rate advantages which foreign buyers enjoy (Aida National Franchises, 2002; Property24.Com, 2005). Although the Rand has strengthened since 2002 (Property24.Com, 2005), foreign buyers still find the property prices more affordable in international terms. Purchasers seem to be more attracted by the relative stability of the exchange rates than its absolute level. It seems also that purchasers perceive the stronger currency as a reflection of a strong economy which must suggest to investors that their investments will be safe in such an environment. Some empirical studies, notably Asiedu (2002) and Ahmed et al. (2005), have also identified favourable exchange rates among a range of "pull factors".

Another category of factors identified as "push factors" are probably also fueling the flow of foreign capital into the property market. Some of these factors have been identified as the trend in international interest rates, the Asian and Latin American crises (Ahmed, et al. 2005), and possibly the security situation in the Northern Hemisphere since 2001. For instance, the contention is that the foreigners who invest in the country's property market have been increasing since September 11, 2001, when the United States of America was attacked by terrorists. Due to the nature of the attack, much of which was repeated in

other Western countries, it is contended that investors in the Northern Hemisphere have found the Southern Hemisphere a more attractive location for their investments. South Africa's relatively better-developed infrastructure and economic and financial institutions seem to have encouraged this trend in capital inflows (Ahmed et al, 2005). According to Nieuwoudt (2006), this type of capital inflows affected all commodity-driven countries such as South Africa, Australia, etc. whose equity and bond markets were net recipients. This viewpoint has attributed the phenomenon to the "high commodity prices and low returns in developed countries" as triggers for the capital inflows (Nieuwoudt, 2006). One effect of these inflows that needs to be taken into account is the strengthening of the currencies of the receiving countries, with their implications on export revenues as noted elsewhere in this thesis in relation to the decline in net farm incomes.

Evidently, the Government sees the impact of the foreign buyers as a negative one on the local property market. Without equivocation, the Minister of Agriculture and Land Affairs, Mrs. Thoko Didiza, has expressed strong discomfiture with this situation (Wilson, 2005; Boyle, 2005). The Minister is reported to have openly expressed concern that the relatively stronger purchasing powers of this category of buyers is working to push prices of property higher and beyond the reach of the average South African. As indicated earlier, the Minister followed up on this by empanelling 10 experts to "look into foreign land ownership and, if necessary, recommend legislation or regulations to ensure that foreign buyers do not make it harder for South Africans to get into the property market" (Boyle, 2005). This statement leaves no one in any doubt as to what the intention of the government is on this matter.

But, sector analysts maintain that the types of property that foreign buyers favour are different from the ones that ordinary South Africans buy. The indication is that the South African property market is not homogenous but actually highly segmented. According to Property24.com (2005), foreign buyers invest mostly in "exclusive golf estates, wine farms, and prime coastal properties". These property types do not normally feature in the transactions undertaken by the majority of South Africans. In the same way, it is noted that the bulk of the foreign buyers do not normally seek property in the "lower and middle price brackets" (Property24.com, 2005). According to Real Fact (2005), foreign

buyers typically buy properties in the range of R3 million and above. These commentators insist that foreign buyers do not generally constitute more than 3% of all property buyers in the country (Property24.com, 2005) and are definitely less than 10% of buyers (Aida National Franchises, 2002).

The market developments and momentum may therefore actually be generated by rising domestic demand created by the unprecedented number of South Africans now able to mobilize the resources to invest in property. The main driver of the property prices is the strong effective demand of the "emerging black middle class property buyers" rather than foreigners (Real Fact, 2005). Even in the absence of a systematic assessment of the issue, there is no doubt that South Africa is unique in the large number of its citizens that have been launched into the middle-class status within the last few years, with a tremendous amount of purchasing power unleashed on the domestic market. They therefore see little or no grounds in the assertion that it is foreign buyers who are causing local property prices to go up. Rather, according to this view, foreign buyers are only helping to draw attention to the relative attractiveness of South Africa and boost investor confidence in the country which ultimately benefits the economy as a whole. The rising house prices are seen as more a reflection of local price trends and global trends in the property markets (see Table 3.2).

Table 3.2: Percentage (%) change in worldwide property prices indices (1997- 2005)

Country	First Quarter 2004	First Quarter 2005	Cumulative 1997-2005
South Africa	28.1	23.6	244
Hong Kong	17.4	19.0	-43
Spain	17.2	15.5	145
France	14.7	15.0	87
New Zealand	23.3	12.5	66
United States	8.4	12.5	73
Denmark	6.0	11.3	58
Sweden	7.7	10.0	84
China	7.7	9.8	na
Italy	10.8	9.7	69
Belgium	8.8	9.4	71
Ireland	13.2	6.5	192
Britain	16.9	5.5	154
Canada	5.7	5.2	47
Singapore	-1.5	2.0	na
The Netherlands	5.5	1.9	76
Switzerland	3.4	1.0	12
Australia	17.9	0.4	114
Germany	-0.8	-1.3	-0.2
Japan	-6.4	-5.4	-28

Source: The Economist, 18 June 2005, collated from various national statistical authorities and financial institutions – ABSA, Bulwein, ESRI, Japan Real Estate Institute, Nationwide, Nomisma, NVM, OFHEO, Quotable Value, Stadim, Swiss National Bank, Government sources.

It is not clear what the position of Government is in the light of the foregoing views on the impact of foreign buyers. Without a doubt, the phenomenon created immense wealth for those owning land both directly and through generating better collateral for other forms of investment (Van Schalkwyk, 2006). It was recently reported that the Minister and the Chair of the Panel, Professor Shadrack Gutto, have affirmed that "the process is not in any way retributive or about a retrospective penalty for those already owning land in South Africa (Boyle, 2005). Government is giving assurance that whatever options it comes up with, there will be no negative impact on foreign direct investment in South Africa (Boyle, 2005). But the recent Land Summit held in Johannesburg, South Africa in July 2005 included among the key elements of the draft recommendation, the need to regulate foreign ownership of land as a way of slowing down the increase in agricultural land prices in the country (DLA/DoA, 2005). Earlier in her opening address, the Minister of Agriculture drew attention to the threat posed by foreign buyers (Didiza, 2005).

Whatever decision is taken on the matter, it would seem from the evidence, that the matter is considered an important one and that future policies on the land reform programme and in relation to the broader issue of land ownership in the country will take account of this factor to a greater rather than lesser extent.

3.3.2.2 Farm Technological Advance

Several studies have tried to link farmland prices and farm technological advance within both theoretical and empirical frameworks. The belief that farmland prices are determined by the interaction of supply and demand provides a platform for analyzing the plethora of influences, both direct and indirect (Herdt and Cochrane, 1966). The argument is that technological advance influences supply and demand and through these influences the level of farmland prices. It will be useful here to recall the earlier discussion on the controversies among classical economists concerning the roles of demand and supply in price formation. At one level, demand is influenced by changes in expected income from land which is in turn influenced by a host of other factors such as prices of other goods and services, urbanization, and farm technological advance. Figure 3.5 presents the model employed by Herdt and Cochrane (1966) to analyze the relationship between technological advance and farmland prices in the United States land market.

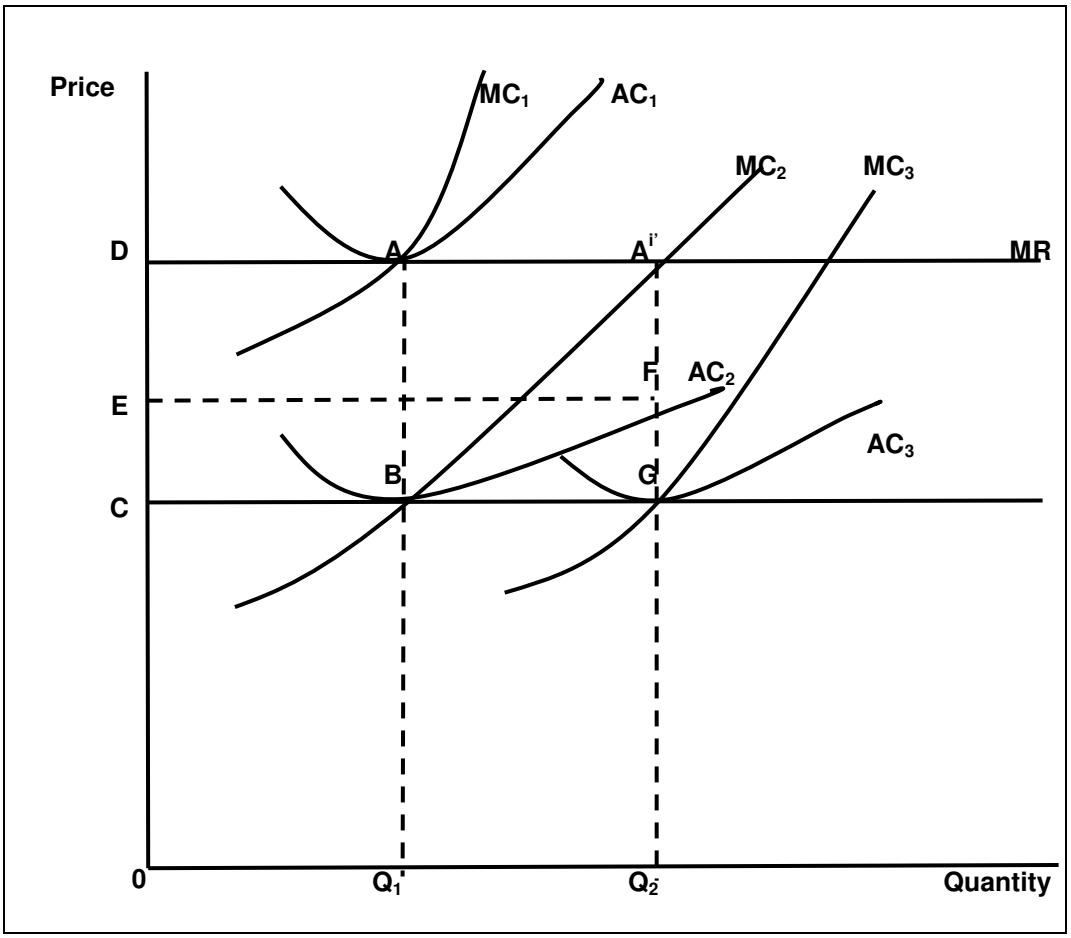

Figure 3.5: Theoretical model of the effect of technological advance on land prices

Point A is an equilibrium position at which the firms added (marginal) costs, MC_1, are exactly covered by added revenues (MR), so that there are no profits being made. At this point, average costs (AC_1) are at a minimum. When technological advance is introduced into the system, the immediate effect will be a reduction in average costs of production. The new average cost curve will become AC_2 and a new equilibrium will be established at the point where MC_2 cuts the horizontal demand curve (equivalent to the MR curve) at the minimum point of AC_2. The reduction in unit costs causes the firm to realize supernormal profits corresponding to the area ABCD. Over the quantity range Q_1-Q_2, the added costs exceed the average costs, so it pays to continue producing additional product because the implication is that marginal product is also increasing. In a production function, this would be happening within Region I (that is the area in a production function where average, marginal, and total products are all increasing at increasing rates

and it pays to continue to produce as long as added returns exceed added costs). The production function in Figure 3.6 provides some indication of how these concepts are related with one another. The firm can therefore push production up to point A' in Figure 3.5 where an equilibrium is established between the marginal revenue and MC_2. This allows for the production of output Q_2 at a much lower average cost of OE leading to a profit of A'FED which exceeds the previous level of profit.

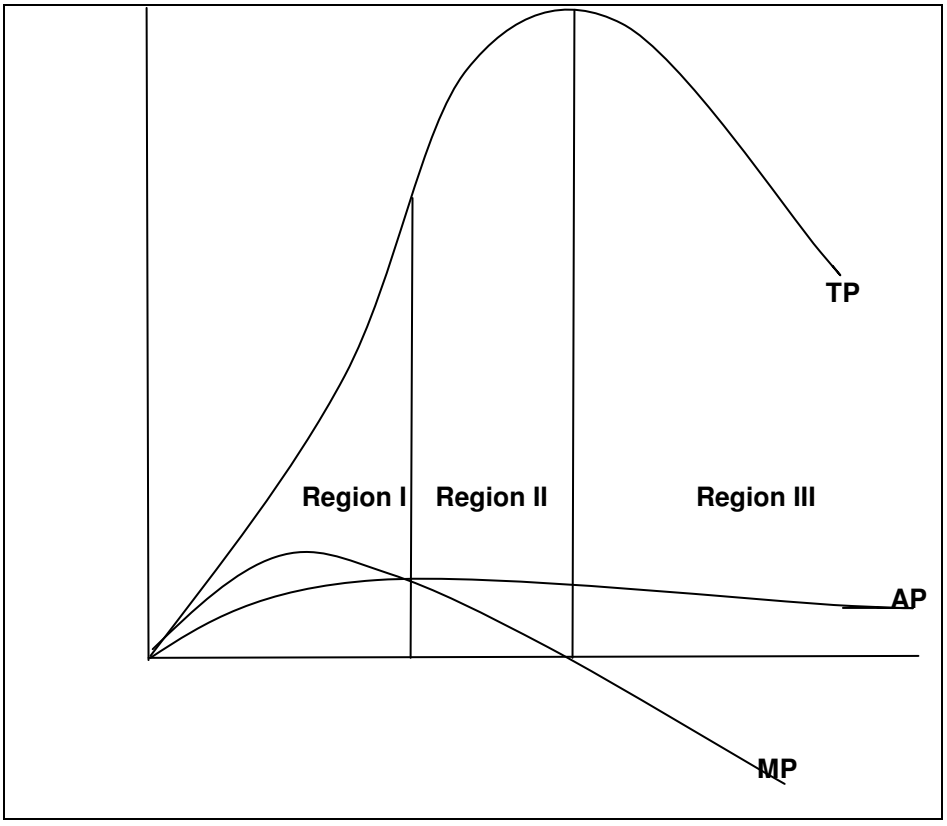

Figure 3.6: Production function showing the 3 decision region

If the firm in Figure 3.5 is large enough to reap the benefits of scale economies, it can lower average costs curve even further to a new level AC_3, average costs at OC, and profit expanding further to A'GCD. This development will encourage the farm to expand by buying more land to allow it to exploit further the benefits of large-scale production. If other farms in the neighbourhood and region adopt the same technology and experience the same positive incentives, the tendency will be for land prices to go up under the pressure of the competitive bidding of numerous farms competing to buy from a fixed supply of land. Eventually, land prices will rise to the point that average costs of the

farms begin to rise again until the farms return to the no-profit position. Farmland prices will then begin to fall as demand for more farmland falls off and some farmers sell off their land to cut their losses.

3.3.2.3 Use of Land for Non-Agricultural Purposes

There are growing concerns that many people who buy land in the South African agricultural land market actually do not intend the land for agricultural production. These non-agricultural uses of land include mostly recreational and conservation activities. In apparent allusion to this phenomenon, the recent Land Summit concluded that there was need to regulate land use to optimize social benefits (DLA/DoA, 2005). In her closing address, the Minister of Agriculture and Land Affairs, Mrs Thoko Didiza, highlighted the issue of changing land use patterns in the country. As she noted, there has been a recent proliferation of such recreational facilities as game parks, golf estates and golf courses (Didiza, 2005). In her view, this is important enough to warrant the development of policy to address the issue. The possibility that this trend may actually reflect market realities of higher returns to land under such non-agricultural uses cannot be overlooked, however.

The contention here is that these non-agricultural uses of land distort the market for agricultural land because they attract higher prices. When a potential seller has to make a choice between selling to an emerging farmer and selling to a company investing in the development of a golf estate, the decision is usually a clear-cut one based on the relative benefits to the seller. Across the country, such trade-offs are becoming quite common and Provincial Governments are being called upon to decide on the relative merits of alternative uses of land and water rights. A recent study carried out in Mpumalanga Province examined the relative benefits of the allocation of water rights between agricultural use and the development of a luxury estate. The study concluded that greater social benefits would accrue to the society from the use of the water for golf estate rather than an existing loss-making agricultural enterprise (Executive Strides, 2005). Indications are that the Provincial Government would accept the recommendations to allocate the

scarce water rights to luxury estate development. Undoubtedly, such findings have implications for land values in general.

3.3.2.4 Collusive Activities of Buyers, Sellers, and Officials

Many commentators are now beginning to turn attention to the fact that the reported prices are often not those that arise from normal sales negotiations based on actual farmland values. The contention is that the sellers and buyers agree to inflate the prices and use the difference between what would be the market-related price and the actual price paid to reward officials who facilitate the sales. Little has been written on this subject to date. On the other hand, it is a frequently mentioned phenomenon associated with the land re-distribution programme which is alledged to lead to excessively high costs for the government that funds the process. Inflated prices would mean that few farms can be covered by the available funds, thus delaying the process further. Already, there are concerns that the process is very slow, and higher farmland prices will make it even more so.

An index of this phenomenon should be able to show instances in which transactions have been conducted in ways that did not follow basic market principles and fairness. In such situations where officials are compensated out of the proceeds of the sales, the reported prices would rarely represent the true market value of the farm or even its productive value. Although many fora have drawn attention to this phenomenon, there has not been any concrete evidence of this and it is doubtful if there ever will be. The question of measuring corruption and reporting it is a very sensitive one even as the old myths that it is impossible to measure are being debunked (World Bank, 1999). For one thing, the perpetrator of corruption must be identified before it can be measured. Individuals exposed to corrupt actions must be willing to admit it before a basis can emerge for measuring its size and extent as well as other dimensions of the phenomenon. As the World Bank notes, the exercise to establish corruption involves data-intensive surveys at the household, enterprise and institutional levels (World Bank, 1999). People will tend to report the existence of corruption when it imparts no benefit to them or when they are hurt by it. In a situation where neither party to a corrupt situation is made worse

off, the incentive to report it will be minimal. Where both parties benefit from the corrupt deal, then the incentive to report its existence will largely disappear.

The case of land transactions that are funded by government cash grants seems to belong to a special class that creates ample scope for unreportable corruption. Here is a case in which the two parties involved, namely the willing seller and willing buyer are assisted by a state official to negotiate a land sale which will be paid for out of the cash grant, and the higher the reported price of the land, the higher the approved cash grant. If an arrangement can be worked out that rewards the official who facilitates this process while the buyer and seller conclude their transaction expeditiously and to their mutual satisfaction, it is inconceivable that anybody would feel any need to divulge this information. More than this, all the parties involved have broken the law and should therefore have an interest in mutual protection. For these reasons, the whole issue will continue to be dismissed as "baseless", "groundless" allegations until, as the World Bank puts it, the debate and analysis move from the "realm of vague, unsubstantiated accusations to a process focused on empirical evidence and systemic weaknesses" (World Bank, 1999). Until such a time, this variable will continue to be treated as qualitative information based on anecdotal evidence. Being able to operationalize this variable to the extent of introducing it in a model of agricultural land prices will constitute a major contribution to policy.

3.4 Methodological Issues

A number of methodologies have been applied in analyzing the process of price formation in the agricultural land market and understanding the factors influencing agricultural land prices. Many of these methodologies have involved descriptive, theoretical, philosophical and analytical approaches. According to Van Schalkwyk (1995), all these approaches have been based on economic principles. Many studies employ non-parametric statistics to analyze the volatility, persistence, and comovement of agricultural prices (Cai, 1995). This particular approach was used by Cai (1995) to analyze the situation in 48 states of the United States over the period 1910-1989. Econometric estimations and mathematical modeling techniques have also featured quite

prominently in works that attempt to explain land price movements. There are about nine main models described in the literature on land price determination which may have relevance, albeit to different degrees, to the basic research questions of this thesis. These models have been enumerated by Cai (1995) as follows:

(a) Portfolio Equilibrium Model
(b) Land Accumulation and Credit Rationing Model
(c) Expectation and Capital Gains Model
(d) Heterogeneous Expectation Model
(e) Non-farmland Investment Opportunities Model
(f) Mixing Rental Income and Inflation Model
(g) Demand Side Model
(h) Rational Bubble Model, and
(i) Geographically Dispersed Market Model.

In the next several sections, brief descriptions of these various models will be presented. Subsequently, the way the literature has treated the particular approach of the present study will be described and similarities, if any, will be highlighted and elaborated.

3.4.1 Portfolio Equilibrium Model

This approach was at the core of Feldstein's (1980a) work. Its major distinction is the application of investment theory to price formation in the agricultural land market. The model makes the central assumption that the land owner, as an economic agent, is in possession of nominal assets of a short-term nature which include bills, land, and capital and has the objective function to maximize the level of wealth from these assets. To what extent this objective is met will depend on how prices are moving and affecting the values of the nominal assets at the disposal of the farmer. The focus of the model is to demonstrate the impact of inflation in agricultural land price formation. It takes off from the position that current price level and rate of inflation are known but future inflation rates are not known and might hold the key to the explanation of the variations in land

prices. What the model sets out to accomplish therefore is to determine the equilibrium asset prices of land and capital.

3.4.2 Land Accumulation and Credit Rationing Model

This model was the pivot of the work of Shalit and Schmitz (1982). As is well known, the demand for agricultural land is a derived demand arising from perceptions of investors about the relative profitability of agricultural production. The model assumes that a farmer evaluates the prospects of profitability in the farm business and then decides to purchase land with the aid of credit allocated on the basis of wealth which can be presented as collateral. If the expected returns to the farm business exceeds the rate of interest on the credit used to purchase the land, the farmer-investor will procure more land and expand agricultural production. This means that the price of land will be a function of the debt per unit of land, the net farm income realized over the past year, and the factors that influence the previous year's consumption which have implications for the level of savings and wealth creation. To understand all these relationships, two equations are set up and estimated, namely a debt equation (as a function of land price, the number of farmers, and the market rate of interest), and a land price equation. A two stage least squares method is employed to correct serial correlation in the error in their covariance structure. The justification for correcting for serial correlation is that higher farmland prices are positively associated with higher debt levels whereas each of the two equations has more or less the same explanatory variables.

3.4.3 Expectation and Capital Gains Model

This model puts a lot of weight on expectations as a key determinant of changes in agricultural land prices. The model assumes that two key factors determine the level of expected land price, namely the capitalized value of the current year's net contribution of real estate to agricultural income, and the real capital gains. Castle and Hoch (1982) made use of econometric estimations to test these assumptions empirically using time-series data spanning 58 years from 1920 – 1978.

3.4.4 Heterogeneous Expectation Model

Brown and Brown (1984) used this model for their studies conducted in the Corn Belt and Lake States of the United States with land prices for the period 1968-1981. The main gist of this model is that farmland prices are affected by uncertainty about the future and involves the interplay of speculative actions of both land sellers and land buyers. The landowner sets a minimum selling price that represents his/her optimal reservation price while those who would buy the land are expected to have higher land price expectations and will therefore attach a higher value to the land. These are the people who would buy the land. The model uses a mathematical approach to show how the optimal reservation price is determined from expectations. In the model, the sale price of the land is assumed to depend on the present value of the land and the distribution of expectations about potential offers for the land.

3.4.5 Non-farmland Investment Opportunities Model

Robinson *et al.,* (1985) used this model to demonstrate the relationships between agricultural and non-agricultural land markets. In this model, it is assumed that the expected growth in net cash returns to the farmland, expectations about inflation, property income, and capital gain taxes, all affect the agricultural land price formation. Time series data spanning 21 years from 1960 – 1981 were obtained from 24 states in the United States to show that spatial variations exist in land prices and that agricultural land prices are affected by non-agricultural use of land.

3.4.6 Mixing Rental Income and Inflation Model

This model combined the real growth in net rental income to land and inflation. The farmer tries to maximize the present value of the land. Its major feature is the hypothesis that agricultural land price is determined by net rental income. Alston (1986) used this model to explain growth in real land price. The real growth in net rental income to land emerged as quite important determinant of land prices. This model employed

econometric approaches to estimate agricultural land prices from a set of explanatory variables which included net rental income and inflation as key elements.

3.4.7 The Demand Side Model

Herdt and Cochrane (1966), Tweeten and Martin (1966), Reynolds and Timmons (1969), Pope, Kramer, Green and Gardner (1979), and Burt (1986), all used variants of this model to explain variations in agricultural land prices. The key assumption is that the price of farmland is completely explained by demand side factors. All the researchers who worked before Burt (1986) had used simultaneous equation estimation approaches. But that approach is handicapped by the fact that there is no supply function for land leading to a tendency to equate demand and supply sides of the land market. As a result, these models did not do well in terms of their explanatory powers. Burt's (1986) work improved on these by using a distributed lag model to capture the dynamic adjustments that are normative in agricultural land price formation. In his model, he avoided the use of aggregated data which have the tendency to complicate the analysis because there is a high degree of heterogeneity in the data and aggregation tantamount to combining unlike terms. Burt (1986) used time-series data for 1959-1982 and imposed an Autoregressive Moving Average (ARMA) structure for their empirical testing. This approach provided more reliable results which put considerable weight on the impact of rent in land price determination. He also concluded that inflation may have a small role to play in the entire process.

3.4.8 Rational Bubble Model

This model which is attributed to the work of Falk (1991) builds on the methodologies popularized in the analysis of the stock market as developed by Campbell and Shiller (1987). It tests the validity of the constant discount rate version of the present value model of farmland prices. Time series data of land prices and rents are used for a period of 65 years from 1921-1986 and confirm a positive correlation between price and rent although a high degree of volatility was observed for the land price data. This is the basis

for the conclusion that farmland price is characterized by rational bubbles. Such rational bubbles are not useful for purposes of explaining variations of asset prices.

3.4.9 Geographically Dispersed Market Model

This model is built on the hedonic pricing principles which look more at the characteristics of the farmland as major determinants of its price. Benirschka and Binkley (1994) constructed a model that is based on the rent theory and that drew on the works of pioneers like David Ricardo and Von Thunen. Its major contribution is an attempt to explain price differences and variations in terms of distance from the central market. The farther away a piece of agricultural land is from the central market or business district the more will the price be subject to booms and busts.

3.4.10 Methodologies Used in South Africa

Van Schalkwyk (1995) carried out a comprehensive review of methodologies employed up to the mid-1990s to determine farmland prices in South Africa. From his review, it emerged that researchers in South African began in the 1960s and 1970s systematically to investigate the causal factors in the persistent increases in farmland prices taking place at the same time. Using a Nerlove-type distributed lag regression model, a number of factors were specifically examined. The model defined the following independent variables: the producer requisite price index, the index of the volume of agricultural production, the interest rate on debt, the total population density per square mile, the density of Europeans per square mile, the percentage of Europeans resident in urban areas and the percentage of Europeans resident in rural areas (Behrmann and Collett, 1970).

It was found that land prices and farm incomes were quite closely related (Hattingh and Herzberg, 1980). In their study, these researchers showed that agricultural land prices in South Africa increased at an annual rate of 7.15% per annum from 1959 to 1972, while net incomes accruing to farmers rose at a rate of 11.42% per annum. This pattern could suggest that land prices and farm incomes were positively correlated, with land prices showing a lagged response to increases in farm incomes. Over the next five years, from

1973 to 1977, the pattern seemed to have changed as farmers' net income increased by 7.94% per annum while land values rose by 11.34%. In this case, net farm incomes seemed to have slowed, but land prices continued to increase all the same. A possible explanation for this could be an increase in demand for agricultural land by farmers wishing to hedge against an erosion of their net incomes.

Nieuwoudt (1980) also found that land rent and land values were highly correlated in the South African agricultural asset market (r=0.72). Based on the analysis of time series data for the period 1948 to 1980, he found even higher correlation (r=0.93) between farm profits and land values. Using a cross sectional data set to analyze factors affecting land prices, Davies (1983) found that the value of dwelling on the farm is the most significant and important factor explaining land price differences in the Pietermaritzburg County. Davies (1983) also examined the influence of farm size and crop value on land prices. His finding that farm size and farmland prices were inversely related, remains controversial and may actually be due to the omission of variables measuring land quality differences.

In their own study, using cross-sectional data, Van Schalkwyk and Groenewald (1993), analyzed the influence of a wide range of factors, including gross farm income, farmers' debt, population density, rainfall stability, percentage dryland, percentage natural grazing, and the percentage irrigable land. Their key finding was that these factors significantly contributed to the differences in farmland prices between different statistical regions of the country (Van Schalkwyk and Groenewald, 1993).

Van Schalkwyk (1995) extended the foregoing analysis in a structural model which allowed for the multi-dimensional effects of several macroeconomic factors to be analyzed within a comprehensive framework. Using this approach, Van Schalkwyk (1995) estimated a farmland price model for different agro-economic regions of South Africa as well as the broad national data. On the basis of the estimates, it was concluded that a spatial pattern existed in the levels of the real farmland prices in South Africa, with returns to farming, inflation, interest rates, and a host of macroeconomic factors playing an important role.

3.5 Cointegration and Error Correction Approach

Another approach that has been employed in several international studies to investigate the determinants of land price variations, beginning from the late 1980s and in the early 1990s is the co-integration analysis. Notable among the early studies are Lloyd and Rayner (1989) and Hallam et al. (1990). As far as is known, no previous studies of the South African agricultural land prices have used co-integration analysis to date. In the next few subsections, some of its key characteristics, especially in the context of the land price studies, will be explored.

3.5.1 The General Theory

One of the commonest procedures to establish a relationship between a set of variables is regression analysis (Gujarati, 2003). In economics, models are constructed in order to attempt an explanation of the relationships among the variables of interest and to forecast their future movements (Pindyck and Rubinfeld, 1991). In some cases, especially when we are dealing with single-equation models, or even multi-equation models for that matter, the approach is to try to predict the future movements in the candidate variables by reference to other variables in a causal framework (Pindyck and Rubinfeld, 1991). These are structural models. In those cases, it is permissible to use cross-sectional data which provide us with the range of possibilities of behavioural patterns for the variables by examining others within the general population.

However, a number of economic relationships can be best understood within a historical context. In order to predict the future behaviour of the concerned variables, we need to examine their past behaviour (Pindyck and Rubinfeld, 1991). It is for this reason that time series models become extremely important. What these models do is to replicate the past trends and tendencies in the variables and use that information to predict their future behaviour. These are the so-called *time-series models* which allow for sophisticated extrapolation as well as serve as effective instruments for forecasting. To this extent, they are important tools for policy formulation and analysis especially where a dynamic system is involved and change is a regular feature.

3.5.2 Application of Co-Integration Theory to Land Price Studies

A growing body of literature is emphasizing the need to establish the nature of the relationship between agricultural land prices and the plethora of factors that have been found to influence their levels and variability. For effective policy formulation, it is useful for the relevant variables to have a long-term or equilibrium relationship (Pindyck and Rubinfeld, 1991).

But a common problem with time series data sets is that they are usually generated by random or stochastic processes. For this reason, their means and variances are subject to high variability so that predictions based on them are usually not easy to interpret. This point was first made by Yule (1926) who questioned the existence of "nonsense" correlations between time series. By this, Yule (1926) was referring to the tendency for the results of regression analysis to infer close association when in fact there is none. This phenomenon is what Granger and Newbold (1974) referred to as *spurious regression phenomenon* which results when variables exhibit apparent co-movement overtime. Fuller (1976) and Dickey and Fuller (1979) as well as Granger (1981) and Phillips (1986) have since formalized the intellectual interest in this phenomenon which Hendry (1986) reviewed with a more historical perspective to trace its origins. For this reason, researchers pay attention to the need to adequately determine and describe the nature of the time series data that we must work with (Khatri, 1994).

In early level econometrics, this phenomenon is encountered when the regression of time series variables generates very high R^2 coefficients which ordinarily would suggest very strong association or the implication that a large part of the variation in the dependent variable is accounted for by variations in the explanatory or independent variables. The problem here is that when the Durbin-Watson test is applied to this regression, it is found that the Durbin-Watson statistics is quite low. This indisputably establishes that the relationship is a phoney one and cannot be the basis for concluding one way or the other.

3.5.3 Stationarity and Non-Stationarity of Time Series

According to Granger and Newbold (1973 and 1974), these properties of the time series variables violate the Gaussian assumptions of regression analysis. This violation of the Gaussian, or normal distribution, assumption, namely the tendency for the means and variances to constantly vary, is now termed *non-stationarity* which means that predictions based on them have little stability over time and therefore of little predictive value. According to theory, a standard normal distribution is one that has a zero mean and variance of one (Davidson and MacKinnon, 2004). The violations of this normality condition identified as non-stationary series are purely random series. Khatri (1994) considers that the two most important questions to ask when working with time series data that are prone to the non-stationarity are; what is their order of integration, and what is the required transformation for stationarity.

Non-stationary series come in various forms. There are those which have no mean value and have variances that trend to infinity as the period of observation lengthens. This type of non-stationary series is termed a *random walk,* because the variances are constantly changing. Hendry and Juselius (2000) have studied economic time series that exhibit these properties and come to the conclusion that they are the rule rather than the exception in terms of their predominance. The closest illustration of the random walk is the movement of a person who has had too much to drink (Gujarati, 2003). To illustrate this, we have:

$X_t = X_{t-1} + \varepsilon_t$, where ε ~NID $(0, \sigma^2)$,

that is, the error term ε is normally and independently distributed with a zero mean and a finite variance, σ^2. The variance of the dependent variable in this situation, X_t, will however tend towards infinity.

Thus, $X_t = \sum_{j=0}^{t-1} e_{\text{t-j}}$, given $X_0 = 0$

There is a rich literature on the phenomenon of stationarity and the theory and mechanics of transforming data series to achieve stationarity, with applications to money demand and agricultural land prices as well as the simplifying assumptions that are made to keep control over the data (Engle and Granger, 1987; Mehra, 1991; Traill, 1979; Hallam et al., 1992 and Lloyd and Rayner, 1993; Davidson and MacKinnon, 2004). Explicit treatment of procedures for testing for stationarity has also been elaborately discussed in the literature (see for example Pindyck and Rubinfeld, 1991 and Gujarati, 2003) which have described the use of autocorrelation functions, among others. Maddala and Kim, 1998; Nelson and Plosser (1982), Durlauf and Phillips (1986), and Stock and Watson (1988), have cautioned that analysts must pay attention to the distinction between difference and trend stationarity. Banerjee et al. (1993) have also demonstrated the procedure for detecting a white noise process which they describe as a second-order stationary process. Kuiper et al. (2003) agree with Banerjee et al. (1993) that "stochastic trend" is what determines the level and direction of changes of variables included in a modeling procedure.

Notationally, stationarity is defined in the following terms:

Mean: $E(Y_t) = \mu$

Variance: $var(Y_t) = E(Y_t - \mu)^2 = \sigma^2$

Covariance: $\gamma_k = E\{(Y_t - \mu)(Y_{t+k} - \mu)$

Durbin and Watson (1950 and 1951), proposed the Durbin-Watson (DW) statistic for doing exactly that. The convenience of this statistic derives from the fact that it is completely determined by the least squares residuals of the model being tested. In their derivation, Durbin and Watson (1950), the DW statistic in the neighbourhood of the value 2 indicates the absence of serial correlation. If the value is below 2, then there is positive serial correlation. Negative serial correlation will be indicated by values above 2 and up to 4.

3.5.4 Structural Breaks and Policy Effects

Much of the current interest in the prices of agricultural land derive from concern about the impact increases in prices would have on the on-going land reform programme. This possibility was already foreseen in the early days of the land reform programme when Van den Brink *et al.* (1996) were asking the important question as to what the fiscal costs of the programme would be when it involves the transfer of a significant amount of land at market prices and financed by the public sector to enable previously disadvantaged households afford land and the complementary investments. The answer to these questions is now largely known. The government is financing the programme which involves the provision of cash grants to households in addition to other forms of support as part of a Comprehensive Agrcultural Support Programme (CASP). The fact that market forces and other factors have a free reign provides strong justification for the perception that a stochastic trend may enter the land price system of South Africa in this era of land reform and therefore warrant the use of the foregoing methodologies to analyze the trend and conclude on the factors that influence these tendencies in order to make valid contributions to policy.

In addition to the strategies related to the land reform programme outlined above, this is also a period of rapid change embracing the entire agricultural sector. A range of other economy-wide policies are also taking place within South Africa some of which obviously have implications for the agricultural sector, including land issues. In chapter 2, the recent policy developments in South Africa culminating in the deregulation of the agricultural market have been highlighted. The most visible of the policy issues is the enactment of the Marketing of Agricultural Products Act of 1996 (Bayley, 2000; Van Schalkwyk, Groenewald and Jooste, 2003). According to Bayley (2000), the deregulation of the South African agricultural sector implies a virtual “revolution in the market”. The “revolutionary” element here is the rapid pace of policy development and the tinkering with new ideas aimed at effecting a change of the status quo ante to enhance livelihoods and change the circumstances of a people coming from a background of deep-seated deprivation. In some sense, the black population’s emergence had all the trimmings of a re-entry from outer space; everything virtually began anew. How the insights gained from

the review of literature will be applied in the particular case of South African land prices will be elaborated in the chapter on the model used.

The literature on cointegration theory recognizes structural change as an important factor in the reliability of the models constructed to predict key relationships in the economic system. The majority of econometric models assume that the variables are continuous so that changes in one affect the other variables in a definite and predictable way (Pindyck and Rubinfeld, 1991). But when the underlying data for the model are associated with significant events in the system, the slopes or intercepts, or both, are likely to shift and this will affect the results we obtain from the estimation of the models (Pindyck and Rubinfeld, 1991). Maddala and Kim (1998) identify such events as the Great Depression, a war, a piece of legislation, oil price shocks, etc as examples of structural breaks which influence the validity of models using time series data. According to them, such breaks affect the usefulness of the models for purposes of forecasting and analyzing the effects of changes in policy (Maddala and Kim, 1998).

In fact, the existence of structural breaks in a data series have been found to constitute a major source of error (Perron, 1989; Balke, 1991; Hendry & Massmann, 2005; and Gutierrez, Erickson and Westerlund, 2005). The conventional and also convenient assumption of constant coefficients and cointegrating vectors has been established to be quite restrictive. In the face of a structural break, these are the models that exhibit the worst performance and weakest predictive power (Maddala and Kim, 1998). Most significantly, the effect of structural break on time series data can affect judgment about the statistical properties of the data which has implications for the usefulness of the results when they are employed in estimation procedures. According to Perron (1989) and others, one problem is that if structural breaks are not taken into account before testing for unit root, the tendency is for the result to incorrectly lead to the acceptance of the null hypothesis of the existence of unit root when the true situation is that the data series is subject to trend stationarity.

Econometric literature has provided useful insights into how the presence of structural breaks can be detected in a data series. A number of highly precise tests have been

developed for this purpose and the specific tests used will depend on the nature of the data and model, and the amount of prior information the analyst has regarding the series, especially with respect to the precise time of the structural break. Maddala and Kim (1998) distinguish among four types of tests as follows:

(i) tests specific to situations in which the break points are known versus those situations in which the break points are unknown.
(ii) tests for single break versus those for multiple breaks.
(iii) tests for univariate versus multivariate relationships.
(iv) Tests for stationary versus nonstationary variables.

Maddala and Kim (1998) consider that appropriate solutions to the defective performance of models when structural breaks are present can be remedied by a number of procedures but that this is only effective when we have ascertained the existence of the structural change. Hence the above tests which can be described briefly.

3.5.4.1 Tests with known break points

This is the situation where it is known with some certainty that there is a break point and an analysis of variance test is conducted to establish the fact. According to Chow (1960), these tests are appropriate for stationary variables where a single break point may have occurred. These tests are part of the class of tests known as the Chow tests (Pesaran and Pesaran, 1997; Maddala and Kim, 1998; and others). In a linear regression model with k variables and two regimes, implying a single break point, two sub-samples can be defined with their number of observations identified as n_1 and n_2. The straightforward rule is that the number of observations within each of the sub-samples must not be less than k, or the number of variables (or parameters) estimated, such that:

$n_1 => k$ and
$n_2 => k$.

The purpose of the test is to examine the estimated parameters of the model to determine whether or not they are stable across the two sub-samples of the series. The E-Views econometric programme is a convenient tool for carrying out this test which involves the calculation of an F-statistic by the following relationship:

$$F = \frac{(RSS_0 - RSS_T)/(n - k - n_1 + rk)}{RSS_T/(n_1 - rk)}$$

Where

RSS_0 = restricted sum of squares residuals
RSS_T = sum of squared residuals from sub-sample
n = the total number of observations
k = the number of parameters in the estimated equation
r = the number of sets of models

In the E-Views programme, the Chow test is applied by first running the single equation regression. When the regression results are displayed and reviewed, the stability test is then run by opening the equation toolbar and entering the break year in the dialogue box that appears. Taking the example of the present study where the sample is for the period 1955 to 2003, by examining the relevant literature the actual breakpoints can be determined as specific years when the event of interest took place. In this particular study, nine variables are involved and the test for stability can be run on subsamples each of which must have more than nine observations. If a year like 1970 is known to be associated with a particular event, the year is typed into the dialogue box and specifies two sub-samples as follows:
1955 – 1969
1970 – 2003.

According to Dufour (1982) and Maddala and Kim (1998), it is possible to extend the above approach to cases where multiple regimes can be defined and more than two sub-samples can be described.

3.5.4.2 Tests with unknown break points

In some cases, the date of the break is not known with any certainty and the test is run to determine the particular point at which a switch occurs in the values of the relevant coefficients and find the time associated with such regime switch. The phenomenon of the regime switching in the series was first studied by Quandt (1960) and appropriate tests have since been developed to provide insights into this phenomenon. The CUSUM test (that is cumulative sum test of structural stability) was proposed by Brown et al (1975). The test calculates a statistic based on recursive residuals which is graphed as a pair of straight lines drawn at 5% level of significance. If either of the lines is crossed, it is necessary to reject the null hypothesis of correct specification of the regression equation at the 5% level of significance.The purpose of this test is to detect systematic changes in the regression coefficients. According to Maddala and Kim (1998), the CUSUM test calculates the statistic:

$$W_m = \frac{1}{\hat{\sigma}} \sum_{t=k+1}^{m} w_t, \text{ where } m = k + 1,\ldots\ldots,T$$

The stability of the regression model is measured by the location of the statistic W_m. When it remains within the boundary associated with the level of the significance, the null hypothesis is accepted. Otherwise, the null hypothesis is rejected, that is when the statistic crosses the boundary. As can be seen from the equation above, the test is sensitive to the number of parameters being estimated.

An alternative test related to the CUSUM test is concerned with haphazard, as against systematic, changes in the coefficients. This test, denoted as CUSUMSQ, uses the squared recursive residuals and plots quantities in much the same way as the CUSUM,

and tracks the location of the test statistic within boundaries drawn at 5% level of significance.

Alemu's (2003) approach, following Balke (1991), was to apply a recursive analysis using the Dickey-Fuller regression procedure. In that instance, a test procedure with the following layout was specified:

$$Y_t = \mu + \theta DU_t + \beta t + \gamma DT + dD(T_B)_t + \alpha y_{t-1} + \sum_{i=1}^{k} c_t \ \Delta y_{t-i} + e_t$$

Where

μ = the intercept term;

T_B = time of break

$D(T_B)$ = value of 1 if t = T_B + 1, and 0 otherwise;

DU_t = value of 1 if t > T_B , and otherwise

DT = t if t > T_B, and 0 otherwise.

3.5.5 Cointegrating Relationships

Another strand of the methodology which is informed by the work of previous researchers need also to be reviewed at this stage. This relates to what further action is taken on the data series or their treatment once the stationarity properties have been established. The next step is to test for co-integration on the linear combinations of the integrated or stationary series. If a simplified situation of three series is taken as an example, the stationarity condition requires that they are of the same order of integration. Their linear combination thus gives a co-integrated set.

Take the following three stationary series which are all integrated of order I(P):

$X_t \sim I(D_x)$

$Y_t \sim I(D_y)$, and

$Z_t \sim I(D_z)$

A linear combination of these three series will be given as:

$$M_t = \alpha_0 + \beta_1 \ln X_t + \beta_2 \ln Y_t + \beta_3 \ln Z_t$$

where $X_t = I(P')$, $Y_t = I(P')$, and $Z_t = I(P')$.

The three series X_t, Y_t, and Z_t are all co-integrated if $P' < P$. If P=1, then $P'=0$ implying that the combination produces a residual series M_t that is stationary. According to Tambi (1999), consistent with Granger and Newbold (1974) and others, estimates obtained from such co-integrated linear series are reliable and consistent and are fit for describing the steady-state, equilibrium relationship.

At this stage, it is necessary to review the literature with respect to the range of tests necessary to establish co-integration and what corrections are performed when the error term resulting from regressions are related in a way that violates economic theory. In order to set the context for that discussion, a few pre-conditions covered in the literature on co-integration theory need to be reviewed. For the purpose of this thesis, the most important of these relate to the studies reported by Perron (1989) and Lloyd and Rayner (1993) and deal with the questions of structural breaks in time series data and the sequence in which tests to determine stationarity (i.e unit roots tests) should be performed.

As is well known, the long-term trend of the majority of macro-economic data which are often included in modeling of time series is affected by the pattern of policy development within the economy. Often policy disruptions are the rule rather than the exception. Especially in young economies or those undergoing rapid change, frequent policy changes arising from both economic and non-economic considerations are the norm. For this reason, changes in the data series may not always arise from the inherent characters of the data but actually brought about by such policy disruptions. According to Perron (1989), proceeding directly to unit roots tests without firstly eliminating the possibility of structural breaks in the series due to policy developments may lead the analyst into accepting the existence of a unit root when the true situation is different. Perron (1989) therefore prescribes that the data series be first subjected to tests to identify and explain breaks before proceeding to test for other statistical properties of the series.

The other matter which has engaged intense discussions between groups of British researchers concerns the impact of the different types of non-stationary series and how this comes into play in deciding how to proceed with the modeling exercise in terms of prior data handling and sequencing of tests. In commenting on the findings of Hallam et al (1992) regarding the application of co-integration analysis to land prices, Lloyd and Rayner (1993) draw attention to three important points as follows:

1. data transformation requirements prior to establishing such statistical properties as non-stationarity or otherwise,
2. distinction between a difference-stationarity process (DSP) and a trend-stationarity process (TSP) and how this determines the sequencing of steps in the modeling process,
3. measures to establish the validity of tests of stationarity due to their inherent fragility.

In relation to data transformation, the contention of Lloyd and Rayner (1993) is that data stabilization is a pre-condition for the productive use of time series data due to the fact that economic time series have a tendency for their variances to increase with the level of the series. Land prices seem to be particularly prone to this tendency because as they evolve through time the mean and variance progressively increase (Lloyd and Rayner, 1993). For this reason, they recommend the use of log transformations instead of the raw data in performing econometric procedures based on time series of this nature (Lloyd and Rayner, 1993). They take note of the alternative procedure for variance stabilization involving the application of difference operator, but observe that this procedure is only able to remove time-dependent mean without any noticeable effect on the variance. In their opinion, log transformations are also favoured because they provide an easier basis for the interpretation of the underlying economic phenomena, such as rates of growth.

However, Hallam (1993), whose earlier article, Hallam et al (1992), was the subject of this discussion, replied that such transformations do not normally add value to the analysis since his own, and subsequently Lloyd and Rayner's (1993), unit root tests in the context of land price modeling, did not yield any significant differences in outcomes attributable to log transformation. It is possible therefore, that the size of the sample is the

deciding factor, since, as also noted by Lloyd and Rayner (1993), log transformations have more noticeable effects when long time series data are involved. In general, land price series are not that long (Lloyd and Rayner, 1993). It would seem therefore that convenience, in terms of time and costs, may have a controlling influence on what the researcher eventually does in this respect.

The other matter elaborately considered by Lloyd and Rayner (1993) concerns the distinction between trend stationarity processes (TSP) and difference stationarity processes (DSP) and how this influences the sequencing of econometric procedures involving time series. Previously, this distinction has been established in line with the works of Nelson and Plosser (1982), Durlauf and Phillips (1986), and Stock and Watson (1988). But Lloyd and Rayner (1993) add the dimension that different variables to be included in a model may exhibit different stationarity properties which need to be established in advance in order to determine whether or not they can be modeled together. For instance, whereas difference stationarity processes are those processes whose non-stationary precursors can be rendered stationary by differencing, in the case of trend stationarity processes, it is necessary to apply detrending by inclusion of a trend term in order to render the previously non-stationary process stationary. According to Lloyd and Rayner (1993), a trend stationary process and difference stationary process cannot be co-integrated because a trend stationary process is deterministic while a difference stationary process is stochastic.

The implication of the above caveat is clear. As is well-known, the co-integration theory requires that movements in one variable in the log-run mirrors movements in the other variables included in the model. But a stochastic process cannot be deterministic (Lloyd and Rayner, 1993). Therefore, there is no possibility of the movements in the TSP mirroring movements in the DSP within the model of land prices should they be erroneously included in one model. The overall comment by Lloyd and Rayner (1993) arose from their contention that Hallam et al (1992) regarded land area sold as difference stationary process whereas it was a trend stationary process. In their view, it was inappropriate to model these two together and the outcome would be definitely spurious. But Hallam (1993) countered this assertion and insisted their likelihood-ratio tests based

on the work of Dickey and Fuller (1981) established the area data as difference stationarity processes.

Lloyd and Rayner's (1993) final point on this subject addressed the question of the fragility of tests conducted to establish the existence of unit roots. Research has shown that these tests have low power as a general rule (Lloyd and Rayner, 1993, and others). For this reason, there is a very high probability of accepting the null hypothesis that there is a unit root even when the series is stationary. Lloyd and Rayner (1993) also think that this difficulty might be complicated by the fact that time series may not be purely autoregressive but may actually contain moving-average components. Their suggestion for getting around these difficulties is to introduce an ARIMA (integrated autoregressive moving average) model and first establish the presence of moving-average components before going on to test for unit roots.

The literature on co-integration theory has identified one fundamental difficulty with the approach and this refers to the tendency for the long-run information on the relationships among the economic variables to be lost due to the process of differencing to obtain stationarity (Pindyck and Rubinfeld, 1991). Such a problem arises from the necessity to undertake a large number of prior procedures to accommodate the common problems inherent in time series such as non-stationarity and structural breaks due to policy and non-policy set ups, economic and non-economic actions, etc. (Granger, 1981; Granger and Newbold, 1974; Hallam et al., 1992; Lloyd and Rayner, and Orme, 1991, and others). As has been reviewed earlier, the most common procedures include log transformations intended for variance stabilization, and various statistical tests to establish structural breaks in the data, and unit roots testing to establish stationarity or otherwise in the data set. It is all these prior actions on the data set that lead to the tendency for long-run information that the data would ordinarily contain to be lost and this can be quite serious if remedial action is not taken because again, it can lead us back to the same uncomfortable position of drawing spurious conclusions on the basis of the regressions.

Taking the process of differencing for instance, with each procedure part of the series is eliminated and the sample size shrinks. Thus, the resulting series, though now stationary,

generally does not cover the original sample period and therefore cannot be representative of the conditions represented by the sample. Such regressions would be little help for policy purposes because of their poor predictive power.

3.5.6 Error Correction Models

In this regard, the literature draws attention to one important merit of co-integration analysis in terms of error correction (Engle and Granger, 1987; Hendry, 1993; Johansen, 1988 and 1991; Phillips 1986, 1987, 1991 and 1995; Phillips and Durlauf, 1986; Phillips and Hansen, 1990; and Sims, Stock and Watson, 1990). All these studies have shown that it is possible for a model to integrate the long-run equilibrium relations and short-run dynamics. Essentially, the concept of co-integration entails the re-incorporation of long-run information lost from a series by the process of differencing (Lloyd and Rayner, 1990).

Let us specify the following equation to depict a long-run relationship for a series established to have a unit root:

$$m_t = \alpha_0 + \alpha_1 y_t + \alpha_2 r_t + \mu_t$$

The residuals represented by μ_t are then tested for stationarity to determine whether a co-integrating relationship can be established. In order to do this, an auxiliary regression of the following form is run on the residuals:

$$\Delta\mu_t = \beta_1 \mu_{t-1} + \sum_{i=1}^{n} \beta_{1+i} \Delta \mu_{t-1} + \varepsilon_t$$

This equation represents the application of the unit roots test on the residuals in the residual-based cointegration procedure. As must be obvious already, the residuals result from the OLS regression on the levels of the variable series being modeled. If the residuals prove to be stationary, then there is cointegration. In that case, we expect the results of this regression to produce a negative coefficient for the residual term. The

statistical test is also expected to show high significance which might confirm a white noise process.

If there is a co-integrating relationship, then the OLS estimates of the coefficients in the auxiliary regression above will be consistent and the tendency is for them to converge quickly to mirror the true long-run parameters. In the analysis of agricultural land prices, the existence of such a co-integrating relationship will suggest that there is a long-term and stable relationship among the key variables introduced in the model. Conversely, rejecting the hypothesis of stationarity, which tantamounts to the suggestion that a co-integrating relationship does not exist, would mean that such a stable relationship does not obtain, and that the pattern of their short-term relationship is not exactly predictable. This would suggest that the equation resulting from the regression will be a short-run rather than a long-run relationship. In that case, no error correction will be necessary.

Assuming we have confirmed the existence of a co-integrating relationship, then we can proceed to a second stage to define the error correction model as follows:

$$\Delta m_t = \gamma_0 + \gamma_1 \mu_{t-1} + \sum_{i=1}^{n} (\gamma_{2i} \Delta y_{t-i} + \gamma_{3i} \Delta r_{t-1}) + \mu$$

What the model says is essentially communicated through the term, $\mu_{t-1,}$ which represents the deviations from long-run equilibrium and links both short-term and long-run information contained in the variables. It is this convergence of estimates to their long-run equilibrium that constitutes error correction and neutralizes the problem created by differencing in order to achieve variable stability or stationarity. The literature provides more information on the results that emerge when co-integration theory is applied to the analysis of land prices. In their research, Lloyd and Rayner (1990) provide the following summary:

1. with co-integrated variables, OLS estimates are close to their true values especially if the sample size is very large;

2. even if the model has been misspecified, biases arising from autocorrelation (that is correlation between the independent variables and the error terms) are generally minimal;
3. there is generally no significant differences in the efficiency of estimates between long term and short term parameters when the error correction model is fitted;
4. when all the variables are co-integrated, that is I(1), an error correction model can be fitted to the data to provide estimates of the short-run relationships. Conversely, data generated by an error correction model must be co-integrated as required by the Granger representation theorem (Granger, 1986; Engle and Granger, 1987);
5. if two variables, X_t and Y_t, are co-integrated, then there must be Granger Causality in at least one direction (Granger, 1986).

Landmark steps in co-integration modeling are illustrated in Figure 3.7 below.

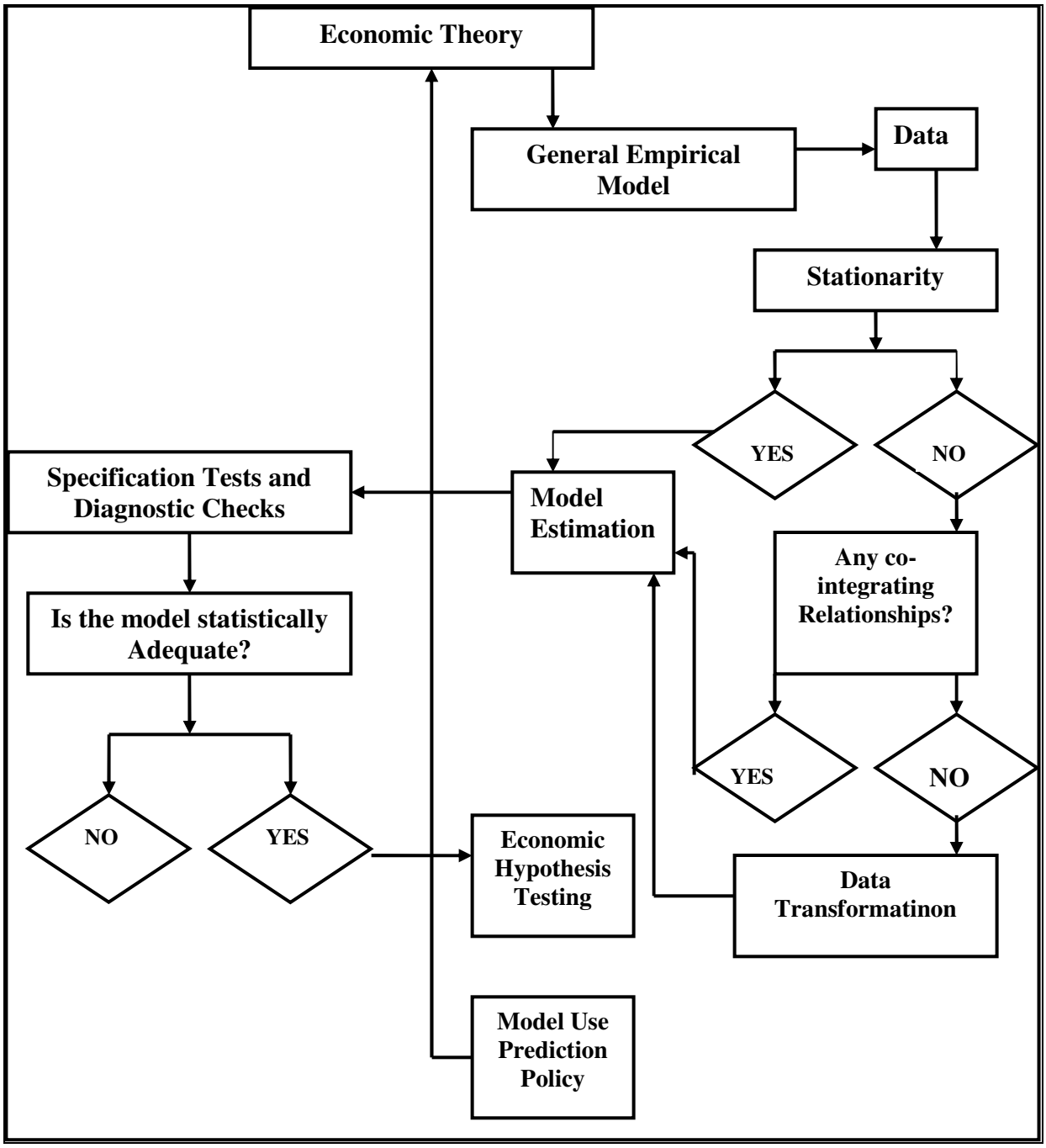

Figure 3.7: The new econometric methodology
Source: Pauly, P. (1997), Modelling Workshop, University of Pretoria

3.5.7 Testing Procedures in Co-Integration

Finally, the conditions and procedures for testing to establish co-integrating relationships have been well researched in the literature and ample guidance is available on how to proceed on these questions. According to Engle and Granger (1987), seven distinct tests

can be conducted to establish co-integration and these tests have been identified as follows:

a. Cointegrating Regression Durbin-Watson (CRDW) test
b. The Dickey-Fuller (DF) test
c. The Augmented Dickey-Fuller (ADF) test
d. The Restricted Vector Autoregression (RVAR) test
e. The Augmented Restricted Vector Autoregression (ARVAR) test
f. The Unrestricted Vector Autoregression (UVAR) test
g. The Augmented Unrestricted Vector Autoregression (AUVAR) test.

However, three of these tests are considered more useful for purposes of analyzing the sort of data we encounter in the process of modeling land prices. According to Hallam, Machado, and Rapsomanikis (1992), the most popular tests of co-integration are:

- the co-integrating regression Durbin–Watson (CRDW) test,
- the Dickey-Fuller (DF) test, and
- the Augmented Dickey-Fuller (ADF) test.

The CRDW test was developed by Sargan and Bhargava (1983) while Dickey and Fuller were responsible for the DF and ADF tests (Dickey and Fuller, 1979 and 1981). According to Hallam, Machado and Rapsomanikis (1992), these three tests are usually applied together in any one study and they re-inforce one another.

Usually, according to the literature (Hallam, Machado and Rapsomanikis, 1992), application of these tests involves a two-stage process. The first stage is to establish the order of integration of the series. In developing the theoretical framework earlier, these element has been highlighted as a fundamental step in the co-integration process because it is the deciding step as to whether or not the approach progresses to subsequent steps. If at this stage, each of the variables are integrated to the same order, then there is a meaningful relationship that can be further assessed. If the variables do not all have the same order of integration, then it is concluded that there is no meaningful relationship and regression of the variables will not make sense as it is likely to lead to spurious outcomes.

As has been hinted earlier, the procedure recommended by Sargan and Bhargava (1983) in the Durbin-Watson statistics (CRDW) proceeds by regressing a variable *x* on a constant *c* to yield the following relation:

$x_t = c + \mu_t$

where x_t is a variable exhibiting random walk properties, and the error term, μ_t, has a unit root, such that a relations of the type

$\mu_t = r\,\mu_{t-1} + v_t$

depicts a situation where the error term is equal to its one-period lag and a residual term *v* that is normally and independently distributed with a zero mean and constant variance. This relation will suggest a unit root for the random walk given that *r* has a value of one. If the *r* has a value less than one then we will be dealing with the alternative hypothesis that the series follows a stationary process of the first-order Markov variant. This test will yield test statistics that can be compared with the critical values provided by Sargan and Bhargava (1983). When the values are greater than zero we are led to reject the null hypothesis of unit root and accept the alternative instead.

Testing with the Dickey-Fuller procedure under the null hypothesis that the variable *x* is a random walk requires that the coefficient *p* is unity in the equation:

$x_t = p x_{t-1} + w_t$

In this case, for the null hypothesis of a unit root to be accepted, *p* must be unity so that the series x_t equals its one-period lagged value with a random residual *w* with zero mean and constant variance.

We can re-formulate the above relation in the following way, by subtracting x_{t-1} from each side to obtain:

$x_t - x_{t-1} = (p x_{t-1} + w_t) - x_{t-1}$, which yields

$$\Delta x_t = p' x_{t-1} + w_t$$

where p' equals $(p-1)$ which will be zero if x is a random walk. If x is stationary, then p', will be negative and significantly different from zero. The calculated DF statistic is a ratio of the OLS estimate of p' to its estimated standard error.

The calculated DF examined against the critical (tabulated) values as contained in Fuller (1976). Same decision rule applies for rejecting the null hypothesis or accepting the alternative hypothesis.

The third test in the line up is the Augmented Dickey-Fuller (ADF) whose main point is to provide a simple generalization of the DF test to allow for higher-order autoregressions being accommodated in the model (Hallam, Machado and Rapsomanikis, 1992).

$$\Delta x_t = p' x_{t-1} + \sum_{j=1}^{k} g_j \Delta x_{t-j} + n_t$$

In this equation, the superscript *k* represents the number of lagged differences. The *k* is chosen so as to eliminate any autocorrelation in the residual, n. The calculated ADF is also derived as a ratio of the estimate of the p' to its estimated standard error. When the calculated values are negative and large, the null hypothesis of random walk can be rejected and the alternative hypothesis of stationarity is accepted.

When the above three tests establish that the variables are co-integrated, the second stage of the testing procedure starts to determine whether linear combinations of the co-integrated variables are of the same order of integration as the individual variables (Hallam, Machado and Rapsomanikis, 1992). If the tests at this stage establish that the linear combinations are integrated of the same order as the individual variables, then the variables are adjudged to be co-integrated.

The tests in this phase are looking at the residuals from a static "co-integration regression" in the levels of the variables of interest. These tests employ the same test statistics adopted for the initial tests to establish the orders of integration.

Let us assume the standard linear combination expressed as:

$y_t = a + bx_t + z_t$

where:
y_t is the dependent variable series, while
x_t is the explanatory variable series with coefficient b, and
z_t represents the residuals.

In this equation, the tests are applied to the estimated residuals, Z_t, which have been derived from the OLS regression of the series. The null hypothesis is set to expect the residuals to follow a random walk. The critical values are as tabulated in Sargan and Bhargava (1983). If the residuals are a random walk, that is they are not co-integrated, the calculated CRDW statistic will not be significantly greater than zero. In the case of the DF and ADF statistics, the same procedure is followed in obtaining the calculated values as was done in the first stage of the tests. If the calculated values are negative and large, then we reject the null hypothesis of no co-integration (random walk) and instead accept the alternative hypothesis of stationarity. Both Engle and Yoo (1987) and Engle and Granger (1987) provide the critical values against which the calculated values are compared for the decision to be taken on whether or not to accept the null hypothesis.

The three tests described above are vital in overcoming the misleading results that often arise from the use of the conventional t-tests. However, these tests have their own problems, as noted by Bannerjee et al., (1986), including the fact that the OLS estimates may have substantial small-sample bias. It is also important to be aware that both the DF and ADF tests may be sensitive to the choice of dependent variable whereas the CRDW test is neutral to the nature of the dependent variable chosen. Another issue associated

with the use of these tests is that they have little power when the roots in the regression of the residuals may not be unity but are quite close to it (Sargan and Bhargava, 1983).

3.5.8 Vector Autoregression Analysis

The literature presents several alternative procedures for handling time series models, especially in the multivariate cases. One of these procedures is the Vector Autoregression Analysis better known by its short-hand acronym, VAR. According to Pindyck and Rubinfeld (1991), the VAR is normally not limited to the verification of a given economic theory which is what other econometric modeling techniques generally do, but adopts a more or less exploratory approach. In this way, the VAR represents the analysts idea of "shooting in the dark" to the extent that it departs from the restrictions imposed by economic theory within which framework other models are generally constructed. This is why, whereas the other models are referred to as "structural", the VAR is an example of "non-structural" modeling because it brings in assumptions of both an exploratory nature as well as those imposed by economic theory, thereby allowing for the identification of new relationships, or "surprises" as aptly described by Sims (1980).

The main purpose of VAR models is to analyze the impact of dynamic random disturbances on the system and show the dynamic effect of the impact of unitary shocks on a variety of variables that provide insights into the workings of important aspects of the economy (Abou-Stait, 2005). According to Hendry and Juselius (2001), a VAR model is a convenient tool for presenting summary information on autocovariances of the data. Because of the pattern of relationships in land price determination, many researchers have increasingly used the VAR modeling approach for their investigation, and among them Awokuse and Duke (2004) and Roche & McQuinn (2000) stand out. The VAR modeling process is therefore commonly referred to as the system approach and has been extensively reviewed in the literature (Ahlgren and Nyblom, 2001). It is usually necessary to distinguish clearly between endogenous variables and exogenous variables in the VAR model.

The typical mathematical representation of a VAR as illustrated in the manuals to the E-Views 3.1 and 4.0 econometric packages (E-Views 1997; E-Views, 2000) can be as follows:

$$Y_t = AY_{t-1} + ... + AY_{t-p} + BX_t + \varepsilon_t$$

where Y_t is a vector of endogenous variables, X_t is a vector of exogenous variables, while $A_1 \ldots A_p$ and B are matrices of coefficients to be estimated. The final term in the equation, ε_t is a vector of innovations that impact on the endogenous variables and are likely to be correlated with their current period values but uncorrelated with their previous period or lagged values. In the E-Views estimation window, the variables are arrayed in a way that places the endogenous variables on the left-hand side of the equation while the exogenous variables and the lagged values of the endogenous variable are on the right-hand side of the equation.

An important attribute of VARs is that the lag length chosen in the estimation is key to how closely the model mrirrors reality (Johansen, 1991; Ozcicek and McMillin, 1997; Yang, 2002; among others). According to Gredenhoff and Karlsson (1999), inference in vector autoregressive models depends on the choice of the lag length. When the lag length chosen differs from the true lag length, the results produced by the estimation are inconsistent (Braun and Mittnik, 1993). Lutkepohl (1993) discusses the consequences of "overfitting" and "underfitting". Overfitting refers to a situation where a higher order lag length is used for the estimation and leads to an increase in the mean-square forecast errots pf the VAR. On the other hand, underfitting refers to selecting less than the appropriate lag length. In this case, autocorrelated errors result (Lutkepohl, 1993). According to Hafer and Sheehan (1989), the accuracy of the forecasts generated by VAR models varies according to the lag length employed. The best guide in deciding on the correct lag length to use in the VAR modeling process is inspect the trend in the level of an information criterion. Researchers have generally found it convenient to use such information criterion as Akaike Information Criterion (AIC), and the Schwarz Bayesian Criterion (SBC). The decision rule is generally to select the lag length consistent with the

minimization of the particular information criterion under consideration (Khatri, 1994; Yang, 2001).

There is often a choice to be made between symmetric and asymmetric lag lengths. Researchers like Hsiao (1981) and Keating (1993 and 1995) have provided definitions of these concepts. Symmetric lags are those that are the same for all variables for all the equations of the model. In these cases, it is sufficient to use an explicit statistical criterion such as the AIC or SBC as indicated above. These lag lengths are convenient and the associated VAR models are easily estimated since the specification of the equations is the same, OLS techniques yield efficient parameter estimates. But a number of researchers have established that there is no strong justification in terms of economic theory that lag lengths cannot differ from variable to variable and from equation to equation within the same model. According to Hsiao (1981), it is perfectly possible to estimate VAR models in which different lag lengths are used for different variables in the model. This is a case of asymmetric lag lengths. Keating (1993 and 1995) has worked with such asymmetric lag lengths in which each of the variables in a given model is associated with a different lag length although the lag length associated with that particular variable remains the same for all the equations of the model. In this case also, OLS techniques can be used to produce efficient parameter estimates (Oszicek and McMillin, 1997).

An important question that researchers often confront in working with VAR models is how to deal with the so-called outliers. These are the large residuals that usually become manifest in an estimation process due to the special circumstances in which a data generation process has taken place. According to Nielsen (2004), economic time series are often affected by such special circumstances as policy interventions, labour relations issues or even measurement errors in the data collection procedure itself. Special procedures have therefore been developed for addressing these issues in VAR modeling, including the use of dummy variables to correct them (Nielsen, 2004).

Another important attribute of the VAR models refers to their outputs in terms of the relationships they model and the impacts they throw lights on. Researchers generally find it convenient to calculate the impulse response functions and variance decompositions

which provide good insights into the pattern of relationships within the system and how changes in structural shocks affect the endogenous variables in the model. In the specific case of the Impulse Response Functions, the idea is to trace the effects of a one standard deviation shock to one of the innovations on current and future period values of the endogenous variables (E-Views, 1997). The Variance Decomposition measure on the other hand depicts the various component shocks that impact on the endogenous variables of the VAR. The Variance Decomposition gives an idea of the relative importance of the various shocks that impact on the endogenous variables (E-Views, 1997). The VAR models are also convenient for tracing questions of causality using the Granger Causality Test which is embedded in the statistical menu of the VAR estimation tool.

3.5.9 Granger Causality Test

Another important test in the co-integration procedure concerns what is known as the Granger-Causality Test. The purpose of Granger Causality tests is to examine the direction of causation in the economic relationship established by the co-integration analysis (Gupta and Mueller, 1982). According to Schimmelpfenning and Thirtle (1994), the cointegration theory in and of itself provides no guidance on the direction of the causal relationship between variables which have been established to be cointegrated. The only thing it says is that there must be Granger Causality in at least one direction. The focus of these tests is on whether or not there is a linkage in at least one direction that establishes causation, not just a relationship (Gupta and Mueller, 1982; Granger, 1988; Granger and Lin, 1995; Granger, 2004). Understandably, in a situation where multiple factors are implicated in the variation of agricultural land prices, it is definitely not enough to establish a relationship; what causes what is important. As useful as co-integration has been to the analysis of agricultural land price variations, it does not explicitly address the direction of causation between variables (Granger, 1988; Hallam, Machado and Rapsomanikis, 1992).

But it is important to be clear about what is precisely meant by the term “causality” in this context. According to Maddala and Kim (1998), Granger himself has in several publications declared that he did not mean causation as it is used in common parlance,

but rather that the term is used in the sense of "precedence" to show that one variable precedes the other in a cointegrating relationship and that one variable contains sufficient information to explain variations in another variable. Granger Causality is concerned with short-run forecastability (Maddala and Kim, 1998). This is one reason it is usually tested to reinforce results obtained from the error correction model which explains the short-run dynamic relationships among a set of cointegrated variables.

3.5.10 Model Selection Criteria

Another important element in econometric modeling processes is the model selection. Pesaran and Smith (1985) have presented an elaborate discussion of the procedure and criteria, highlighting the fact that it involves both statistical and non-statistical considerations and depends on the study objectives, the appeal made to economic theory in providing the necessary guidance for the empirical work, as well as how adequate the model is in statistical terms. For most practical purposes, the concern is with the "statistical fit" of the model. In a number of situations, there is a need to work out the appropriate trade off between "fit" and "parsimony" in econometric modeling (Pesaran and Smith, 1985).

Many computer-based analytical programmes automatically compute the measures that show the extent of linearity or otherwise in the underlying data and relationships. Pesaran and Pesaran (1997) show that the *Microfit* interactive package automatically computes the Theil's criterion by means of which choice can be made between linear and non-linear regression models. The package also computes the values of the criteria functions for measuring the "fit" of the model under consideration. Clements and Hendry (2003) have discussed a range of criteria for evaluating a model on the basis of forecast performance.

Three of the most common criteria functions have been proposed by Akaike (1973 and 1974), Schwarz (1978), and Hannan and Quinn (1979). These measures allow for the determination of the appropriate lag structure of the model in question (Awokuse and Duke, 2004). These will be briefly described in the next few sub-sections.

3.5.10.1 Akaike Information Criterion (AIC)

As already indicated, the Akaike Information Criteria (AIC) is a measure of the appropriate lag structure of the model. By so doing, it provides a basis for concluding about the goodness or closeness of the statistical fit. It also reflects the number of parameters estimated (Maddala and Kim, 1998). Decision rules in the case of the AIC differ according to whether the model is a single equation one or a multiple equation one. Consideration is also given as to whether the relationship being modeled is linear or non-linear.

If $\ell_n(\theta)$ is the maximized value of the log-likelihood function of an econometric model, where

θ is the maximum likelihood estimator of θ, based on a sample size of *n.*
The Akaike Information Criterion (AIC) for the model in question will be defined as:

$$AIC_\ell = \ell_n(\theta) - \rho$$

Where

$\rho \equiv$ Dimension $(\theta) \equiv$ the number of freely estimated parameters.

If the task is to estimate a regression model, the AIC can be represented as:

$$AIC_\sigma = \log(\sigma^2) + \frac{2p}{n}$$

Where

σ^2 is the maximum likelihood (ML) estimator of the variance of the regression residuals, μ_t.

To decide on the model with the best fit in either case, the approach is to examine the AIC_ℓ and AIC_σ values associated with the different model specifications. In the case of AIC_ℓ, the decision rule is to select the model with the highest value of AIC_ℓ, whereas in the case of AIC_σ the decision rule is to select the model with the lowest AIC_σ.

3.5.10.2 The Schwarz Bayesian Criterion (SBC)

The distinction of the SBC is that it provides a large sample approximation to the posterior odds ratio of the models being considered. The following definition is standard for this criterion when considering a maximum likelihood estimation, with the parameters defined as was the case in the corresponding measure for the Akaike Information Criterion:

$$SBC_\ell = \ell_n(\theta) - \frac{1}{2}\rho \log n$$

In the case of regression models, the criterion is commonly re-written as follows:

$$SBC_\sigma = \log(\sigma^2) - \left(\frac{\log n}{n}\right)\rho$$

In the case of the SBC, the decision rule again differs depending on whether we are dealing with the maximum likelihood estimation procedure or a regression model. Where our task relates to ML, the SBC_ℓ across the models are examined and the highest value is selected. In the case of a regression procedure, the model with the lowest SBC_σ is chosen.

3.5.10.3 Hannan-Quinn Criterion (HQC)

The HQC is an important criterion for the selection of the order of autoregressive moving average (ARMA) or vector autoregressive (VAR) models (Hannan & Quinn, 1979), and is defined in either of these cases as:

$$HQC_\ell = \ell_n(\theta) - (\log \log n)\rho$$

or, when a regression model is involved, as follows:

$$HQC_{\sigma} = \log_{\sigma} + \left(\frac{2\log\log n}{n}\right)\rho$$

3.5.10.4 Consistency of the Choice Criteria

As can be expected, different selection criteria have different predictive abilities in terms of providing guidance towards identifying the most appropriate model in respect of the relationship under consideration. It has been found that the SBC and HQC are generally more consistent in terms of predicting the "true model" when the sample size is sufficiently large (Pesaran and Pesaran, 1997). The AIC is known to generally show bias towards models with the least parsimony whereas SBC shows bias towards the models with the most parsimony (that is, with the least number of freely estimated parameters).

3.6 Methodologies for Data Transformation

An important subject for consideration is the way in which the available data are entered into the model since this has practical implications for the results. Mohr *et al.* (1988) have provided a very useful practical guide for using economic indicators in South Africa especially with respect to the construction and use of index numbers and the transformation of data to achieve stability and consistency. They also stress how important it is for understanding the relationships to employ appropriate techniques for interpreting and analyzing the data (Mohr *et al.*, 1988). In a situation where the data span several years and individual series are derived from multiple sources, this need is particularly crucial.

3.7 Forecasting of Estimated Equation

An important outcome of the estimation process using cointegration technique is knowledge of the past behaviour of the time series (Pindyck and Rubinfeld, 1991). With such information, the future trend in the series can be forecasted by a number of

alternative approaches (Ramirez and Khan, 1999; Pollock, 2004). The first step is commonly to judge the forecasting ability of the estimated model (Ramirez and Khan, 1999). This is often done by comparing the fitted and actual values of the dependent variable. Where a good fit is confirmed by a close tracking of the historical series by the fitted series, a forecast can then be performed. The minimum mean-square error prediction of the dependent variable loaded on the E-Views econometric package commonly provides a reliable forecast when all the necessary conditions are met (E-Views, 1997).

3.8 Chapter Summary

This chapter zeroes in on agricultural land prices as the central theme of the thesis. To set the context for the discussion, the thesis first reviews definitions of prices in general and why the study of prices is necessary. The chapter explores some of the theoretical frameworks on price determination going back to the works of the classical economists and the controversies that prevailed over whether demand and supply or cost of production played the most important roles in price determination. Specific research conducted in the United States, Europe and elsewhere was taken as background to an examination of the situation in South African and some of the important methodological questions associated with research on agricultural land prices. The review examined models of land price formation employed in other studies and then looked in some detail at the present value model which has been widely used in past studies. Recognizing the inherent non-stationarity of economic variables, of which prices and the various macro-aggregates identified in the studies are important elements, the review examined the cointegration process and error correction models first to understand their theoretical underpinnings and then to see how they have been applied and how relevant they are in studying the trends in agricultural land prices. The chapter provides clear insights into the various statistical and econometric tests associated with the use of the cointegration analysis in the study of land prices and ends with examining the criteria for deciding on the closeness of statistical fit and appropriateness of model structure.

CHAPTER 4
DATA AND MODEL SPECIFICATION

4.1 Introduction

The purpose of this chapter is to develop the outline of the model for the analysis of the determinants of the variations in agricultural land prices in South Africa. The theory of land price determination has been explored in the preceding chapters. According to the literature which reviewed the dominant theories and research to date, there are important relationships among such factors as agricultural land prices, net farm income, rental income, interest rates, farm debts, inflation rates, capital gains, farm assets, fixed capital stock, gross domestic product (GDP), population, as well as its growth rate. Although net farm income measures the reward to the farmer's investment and can be expected to provide sufficient motivation to invest, some studies introduce additional attributes of the farm's value, namely the total value of agricultural production, or alternatively expressing this on per hectare basis. The basic conclusion that can be drawn from this listing is that both microeconomic and macroeconomic factors play important roles in the determination of agricultural land prices.

In addition to the above-mentioned micro-economic and macro-economic factors, there are numerous other questions which need to be addressed in the context of the policy developments in South Africa around the issue of land, black economic empowerment, redress, and equity. These questions can be conveniently labeled institutional issues since they relate to changes in property rights, rules of the game, and facilitating or enabling environments for the transfer of land and for investments within an agricultural economy undergoing deep-seated restructuring. As has been dealt with in some detail earlier, South Africa's land reform programme is coming from a history of extreme deprivation of the black population which the present government is now trying to correct through explicit "affirmative action" principles that entail clear targeting of the black population with

measures that move them more towards the mainstream of the economic life of the country. These actions have involved frequent policy changes, many of them radical. Any model designed to examine how land prices have developed and what influences them will be incomplete without taking these issues into consideration. According to Clements & Hendry (2003), a model is judged by its forecast performance and this depends, *inter alia*, on its comprehensiveness in terms of the number and nature of variables and relationships it incorporates.

The main task in this regard will be to identify the performance indicators for such policy positions and establish procedures for quantifying them. They will then be incorporated into a model in a way that allows for them to be empirically estimated. In chapter 3, a number of these factors were identified as the cash grants, being provided by government to enable black emerging farmers to acquire land and initiate a farm enterprise under the land redistribution programme known as the Land Redistribution and Agricultural Development programme, (LRAD). At present, these cash grants range from R20,000 to R100,000 per recipient depending on a number of criteria. Government's total budget for 2005/2006 for the cash grants is estimated at about R2 billion (DoA/DLA, 2005).

There are several other factors identified to possibly influence the agricultural land prices in the country outside the macro-economic factors and the directly agricultural factors. These include the impact of foreign buyers who are thought today to prefer South Africa as an investment destination in the wake of the September 11 terrorists attacks in the United States and the subsequent attacks in other parts of the Northern Hemisphere. This particular situation is widely reported in the popular press and is considered so important that the Government has made a pronouncement on it to the effect that it should be investigated to enable Government take appropriate action on the matter. To that extent, it is an important factor to be taken into account in constructing a model of agricultural land prices in the country especially in the light of the present circumstances of unprovoked and unrelenting terrorist activities which threaten to be a permanent feature of international politics today. Already, in the 2006 budget speech to the Parliament, the South African Minister of Finance announced that far-reaching measures would be

implemented to curtail the purchase of land and property by foreigners (Manuel, 2006). President Thabo Mbeki himself had pledged to the nation in his State of the Nation Address for 2006 that the Minister of Agriculture and Land Affairs would during 2006 "…regulate conditions under which foreigners buy land…in line with international norms and practices" (Mbeki, 2006).

Two other factors which must be considered for the completeness of the model are the impact of the non-agricultural uses of land and the reported incidences of collusion among the buyers and sellers and officials which border on corruption. In the case of the non-agricultural uses of land, the review in Chapter 3 has detailed the official position on the matter (see section 3.3.2.3) and this will not be repeated save to point out in what way its inclusion in the model would contribute. It is considered that growing affluence in South Africa is creating a situation where more and more land is demanded for recreational purposes, including home building, leisure and recreation, hunting, etc. These include the eco-tourism uses of land which are implemented through conservation programmes to safeguard the country's rich biodiversity at one level to promote nature-based tourism and at the same time earn tourism revenue for the treasury. As important as this will be, the fact that it is being mentioned frequently warrants its inclusion in the modeling process. There are suggestions that these programmes reduce the amount of land available for redistribution and therefore lead to a situation where prices are pushed up through the interplay of demand and supply in an environment where cash is being injected to facilitate land acquisition. The suggestion is that such a situation has inflationary tendencies and therefore calls for their being explicitly considered in the modeling of land prices in the country.

The question of alleged collusion among government officials and farm owners and prospective buyers is probably mere "corridor talk" at this stage. True enough, it is frequently mentioned in conferences and workshops where participants try to draw attention to the existence of such corrupt activities which have the effect of raising agricultural land prices above the value of the land in order to make money available for corrupt compensation of officials who facilitate these transactions as part of their

statutory duties. A development that was reported in the national media was the alledged tendency of "white farmers" to set prices too high for prospective black buyers to afford, leading to situations where price negotiations continue for three or more years (SABC-2, 2006). According to the report, this problem has been particularly pronounced in the case of restitution claims for which about 7,000 have been outstanding for many years (SABC-2, 2006). This situation is one reason the government, according to the report, is considering "large-scale farm seizures" in cases where such negotiations have been going on for more than three years, while introducing a deadline of 6 months for all new transactions (SABC-2, 2006). While the indication is that government seems to agree that farmland prices have actually increased, it is important to have an open mind about the whole matter at this stage of the analysis and explore the scientific evidence.

One key reason for caution is that both the media and the typical farmer, not being professional farmers, are more likely to base their judgements on nominal prices without taking into account the range of macroeconomic factors such as rate of inflation which may have affected the real values actually transferred. Unfortunately, much of the "corridor talk" that influences a good part of the political sentiments and decisions draw from these sources as well. Whatever the case, some attempt needs to be made at some stage to develop performance criteria that renders this phenomenon measurable so that it can be modelled. In the next section where the structure of the model is specified, more light will be thrown on what can conveniently be modeled and why others could not be included. The emphasis of the thesis on model simplicity and feasibility will be highlighted.

4.2 General Considerations of Candidate Variables for Model

Van Schalkwyk (1995) employed a data set for the period 1955 – 1992 for the major part of his model of the agricultural land prices in South Africa. For purposes of conducting an *ex-ante* evaluation of the effect of a land tax in South Africa, that study (Van Schalkwyk, 1995) used data for the period 1970-1991. A more recent study by Dannhauuser (2001) made use of cross-sectional data for the mid- to late 1990s upon

which linear programming techniques were conducted. This study recognizes the importance of rural land tax in the pricing of land and this has been covered extensively in the literature review. However, with the exception of the Western Cape Province, rural land tax is still not widely operational in South Africa. For this reason, only speculative research and studies on the impact of rural land taxes on farmland prices are possible at present. This thesis therefore considers that a separate study completely devoted to the effect of rural land tax on farmland prices may be more useful when the policy has been finalized and more widely introduced to allow actual impact to be assessed on the basis of actual results. A cointegration analysis would equally be quite revealing since to date no such assessment has been carried out in respect to rural land taxes.

The existing study defined the dependent variable as the real prices of South African agricultural land. The land price data are expressed in real terms on a per hectare basis. The same argument is retained in this study. However, the present study is more circumscribed in terms of its objective which merely seeks to gain an understanding of the trends in agricultural land prices in the country. Quite strictly, the objective suggests that there is no disagreement with earlier findings regarding the causal factors of agricultural land price levels. To that extent, the variables that detect trends should be more important in this study. It has therefore been decided to exclude those variables that relate more to the structure of agricultural production than to price trends.

Another reason for exclusion of some variables is availability of data. The variable measuring cash grants to beneficiaries of the Land Re-distribution for Agricultural Development (LRAD) and the measure of the inflow of capital from foreign buyers competing in the South African agricultural land market fall in this category. However, because of its crucial nature at this time, given the overwhelming interest of various stakeholders and the government, some measure of the impact of foreign buyers will be included in the model, even if it is somewhat imprecise, with the intention of refining it at a later stage. In this regard, two sets of time series data collected and reported by the Reserve Bank of South Africa come close enough to measuring this element. These are reported as:

- Foreign liabilities: Direct investment by private non-banking sector – other short-term capital
- Foreign liabilities: Direct investment by private non-banking sector – other long-term capital.

According to standard definitions employed in national income accounting, foreign liabilities represent domestic physical and financial assets owned by foreigners (Abel, Bernanke and Smith, 1995). The most logical proxies for the expenditures of foreigners to purchase land in the South African property market will no doubt be captured by the direct investment by the private non-banking sector. The distinction between short-term and long-term capital is an important one about which there are conflicting viewpoints. To some, investments to purchase property are of short-term nature while equity investments are long-term. Other opinions insist that equity investments and expenditures on property cannot be distinguished and that both are long-term. It would seem therefore that the most appropriate proxy for the expenditures of foreign buyers to purchase agricultural land would be both measures so that their behaviour within the model would contribute to a better understanding of their relative weights. It should also be of interest to examine the impact of both short-term and long-term capital inflows because of the possibility of some relationship between them.

While the impact of a possible collusion among land owners, buyers and officials makes intuitive sense to model, its measurement would require more procedures and data manipulation than can be easily accomplished at this time. For one thing, most of the needed data cannot be collected directly from the parties involved. It would be necessary to collect a number of indirect data and use them to construct an index that hopefully would capture the phenomenon. Discussions are now going on to identify such indirect data and establish the necessary procedures to construct such indices. Until such a time, it is necessary to drop the variable from the model.

Again, the literature has suggested a strong influence of non-agricultural uses of land on the price of agricultural land. However, the relevant index for measuring this influence is

not available in the form that would permit an efficient estimate. For instance, it would be necessary to collect data on the number of non-agricultural projects to which land is put on an annual basis, which will definitely include all land uses outside the agricultural sector. These investments constitute the full gamut of investments that go on within the economy and it will be difficult and cumbersome to attempt to isolate them and categorize them appropriately. But such investments are included in the Gross Domestic Product (GDP) which is the total value of all the goods and services produced in the economy within any given year. While the GDP includes agricultural investments as well, it can be the single most credible index of non-agricultural investments in any given year and is therefore included in the model as an explanatory variable. In this case, the growth rate of real GDP per capita is used for reasons to be explained in due course.

Farm debt accumulation is clearly an important variable for a host of reasons. In relation to the variations of land prices, Van Schalkwyk (1995) observed that farm debt plays an important role to the extent that it is associated with the rate of inflation and interest rates which invariably affect the expectations about future returns and profitability. For these reasons, real farm debt is included in the model as an explanatory variable.

A final variable of interest relates to the issue of taxation of land. As already indicated, the question of whether or not to introduce a rural land tax in South Africa is still hotly debated and several expert commissions established by the government to advise on this matter have not been able to come to a decision on the way forward. The importance of this variable rests on the suggestion that it affects the farm business in a number of ways, depending on how the tax is structured. In the context of this thesis, the interest is limited to what is considered to be its effect on farmland prices. As developed in the review of the theoretical underpinnings, one important implication of the land tax is that it depresses land prices. How this comes about is still a matter of systematic research and investigations, but it would seem that the more direct effect of the land tax is to reduce the net farm income. If it is true that farmers usually capitalize net farm income into farmland prices, then it is understandable how the imposition of a land tax can lead to a lowering of farmland prices since a much lower net farm income is now being capitalized

into farmland prices that should now be lower than was previously the case. For this reason, net farm income is included in the model to capture some of the complex relationships of which the impact of a rural land tax is an important part.

4.3 Specification of Valid Variables

For effective policy decisions regarding the distribution of agricultural land in the country, it is important to have reliable estimates of the long-term relationships among these variables. The same is true for the planning of strategies and interventions concerning the structure of the agricultural sector in South Africa and the programming of support schemes for the emerging farmers and other members of the farming community whose level of skills and other endowments are expected to impact on the pace of the on-going land reform programme. As has been indicated earlier, one of the objectives of the government in the move to democratize agriculture is to create a black commercial class in agriculture. Adequate knowledge of price formation patterns in the system is crucial for both farmers and non-farmers. In the economics literature, long-term or long-run relationships are the same as equilibrium relationships which represent optimal scenarios under perfect knowledge, institutional arrangements, and technological development.

From the introduction to this thesis and the discussion so far, it is clear that the issue of modeling agricultural land prices in South Africa is not new. What is not well understood today is the nature of the dynamic processes that influence the level of prices in a society undergoing rapid change and where explicit measures are in place to induce farm purchase and sale. It is also of both academic and policy interest to understand the implications of the empowerment strategies aiming to establish a class of previously-disadvantaged citizens to play a part in the country's agricultural economy. This means that a number of the standard variables in land price modeling must be combined with new emerging issues and concepts that have arisen from the new policies now being experimented with to empower the black population and create a black commercial agricultural class. To date, these issues have not yet been modeled in relation to

agricultural land prices. By including such new issues in the model, this thesis would be drawing strength from both theory and popular views. To the extent that the model provides some predictability to the influence of these new issues, this thesis would be considered to have made a major contribution to the whole discussion on agricultural restructuring, land price issues and land reform in the country.

The foregoing situation therefore calls for a specific modeling process which will provide policy makers, researchers, and analysts with the capability to predict the future behaviour of land prices on the basis of how they have behaved in the past and what factors have influenced such behaviour the most. In recent years, this sort of modeling problem has been addressed increasingly by the use of time series modeling based on the theory of co-integration. According to Hallam et al. (1992), co-integration is now regarded as the "empirical counterpart of the theoretical notion of a long-run or equilibrium relationship". Experience with this approach seems to confirm that they provide a strong basis for establishing the nature of the relationship between agricultural land prices and the plethora of factors that have been found to exert some influence on their levels. In an era where the effectiveness of policy in addressing questions of redress and equity is topical, it is important to have one model that can be easily applied to enable policy-makers make speedy decisions about possible modifications and reform whenever that becomes necessary. Everybody in South Africa is all too aware of the consequences of delayed action or incompetent policy actions.

To begin the process of setting up the model, the range of variables introduced under sections 4.1 and 4.2 above will now be presented and examined in greater detail. As already indicated, the variables consist of a set of micro-economic and macro-economic variables which will be described and examined in terms of their relevance and the possibility for obtaining useable data on the variables concerned.

In general, going by the issues covered in the literature reviews in chapters 2 and 3, the following variables can be considered:

(a) Gross Domestic Product

(b) inflation rate
(c) exchange rate
(d) capital gains
(e) real net farm income
(f) value of agricultural production (both total and per hectare)
(g) real debt load
(h) real interest rate on savings
(i) real interest rate on debt
(j) debt-asset ratio
(k) farm size

In addition to the 11 variables outlined above, there are four other variables that can be considered. These are variables associated with the recent policy developments that directly address the question of redress to make the land reform programme more effective and integrate the black population into the nation's agricultural economy. These additional variables include:

(a) cash grants paid to LRAD beneficiaries
(b) the impact of foreign buyers/investors
(c) the impact of non-agricultural uses of land
(d) the effect of collusion among officials and land owners and buyers.

From all the the possible variables, the thesis included the following in the model: real farmland prices per hectare (rlph), real net farm income per hectare (rnfi), real GDP per capita (rgdpc), rate of inflation (infl), real interest rate on debt (rintrd), real short-term foreign capital inflow per hectare (rfbsph), real farm debt per hectare (rfdph), real exchange rate (rsaus or russa), and a dummy for land transfers to the black population (lndtr). The real long-term foreign capital inflow (rfblph) was included as cross-check on the validity of the short-term measure of foreign buyer influence and also because it could have its own effect, even if indirect. These variables are discussed in the next sections.

4.3.1 Agricultural Land Prices (rlph)

As has been mentioned earlier, agricultural land prices per hectare have been defined as the dependent variable in this study. It is important to describe how these data have been collected and the type of transformation that was considered necessary in order to render them useable for purposes of this modeling exercise. All the original data came from the records of the Department of Agriculture and Land Affairs. According to Van Schalkwyk (1995), the Directorate of Agricultural Economic Trends maintains and reports data based on which land price data can be calculated on per hectare basis. These are land values, area of farmland in hectares, number of farms, real estate debt, and net returns to farming. As explained earlier, the original cross-section/time-series data spanned the period 1955-1992. The present study makes use of the time-series component of the land price data and extends them up to 2003 based on additional data derived from Deeds Registry as well as the Human Sciences Research Council (HSRC), as reported in Aliber and Mokoena (2003).

Nominal farmland prices were examined to see the trend over the years. The graph of this trend is presented in Figure 4.1. The picture that comes through is that of a relatively stable market over the 1960s and most of the 1970s. Then came a period of smooth upward but almost imperceptible climb in prices beginning from the mid-1970s. From the early 1980s, the price increases became much more noticeable. In the early 1990s just before and after the democratic elections, nominal land prices seemed to have fallen, particularly about 1993. This situation may reflect the panic among several white commercial farmers who had doubts about the motives of the in-coming ANC government and the long-term stability of the country. It is known that many of these farmers sold out their land and left the country.

However, as Figure 4.1 shows, from the later half of the 1990s, confidence seemed to have returned among the white farmers and land transactions apparently picked up with land prices beginning to climb smoothly again. But from the end of 2000 and early 2001, prices increased significantly, in some cases, by nearly 200%. This trend continued to the

end of the observation period with an unreleaved precipitous climb. It was this pattern that caused the huge panic among policy makers and the farming community that has already been alluded to in the review and elsewhere in this thesis. As already noted in Chapter 3, the period was also marked by similar sharp increases in house prices across the country (see Table 3.2 for a comparison of house prices in 20 countries in Asia, America, Europe and Africa).

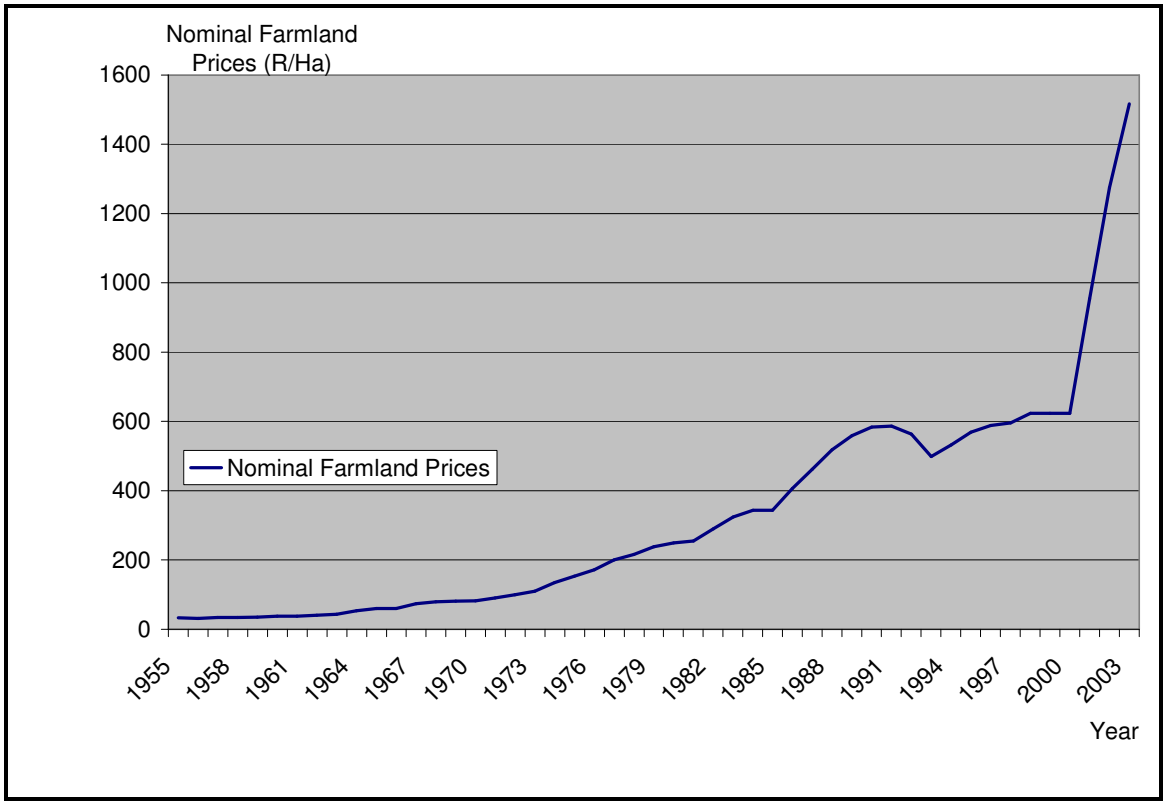

Figure 4.1: Trends in nominal farmland prices per ha 1955-2003

The trends in real farmland prices are presented in Figure 4.2 and show that real farmland prices exhibited much greater volatility than nominal farmland prices over the observation period, 1955-2003. According to Figure 4.2, real farmland prices rose steadily up to about 1977/78 when they attained their highest level ever. Following that peak, real farmland prices began falling steadily up to 1993. The indication is that real farmland prices were more or less stable from 1994 till about 2000 when the dramatic

swing occurred in the price trends and they began climbing quite precipitously. As Figure 4.2 suggests, farmland prices in 2003 may have been more or less at the same level as they were in 1955. This observation points up the need for the more scientific evidence for farmland price trends rather than "corridor talk" as highlighted in section 4.1 above. It is also possible that farmland prices can be lower if quality differences were taken into account in the present analysis. As is well known, significant investments have been made in the farm sector in the form of the construction and management of irrigation and drainage systems, other forms of land developments such as orchards and pastures (Nieuwoudt, 2006). If these investments are deducted from the land prices, they will be significantly lower priced than is currently the case. However, while the present study recognizes the importance of such an analysis, the relevant data for undertaking such calculations on a nation-wide basis are currently not available and therefore it was not possible to go that far. Future research in this area should be quite informative.

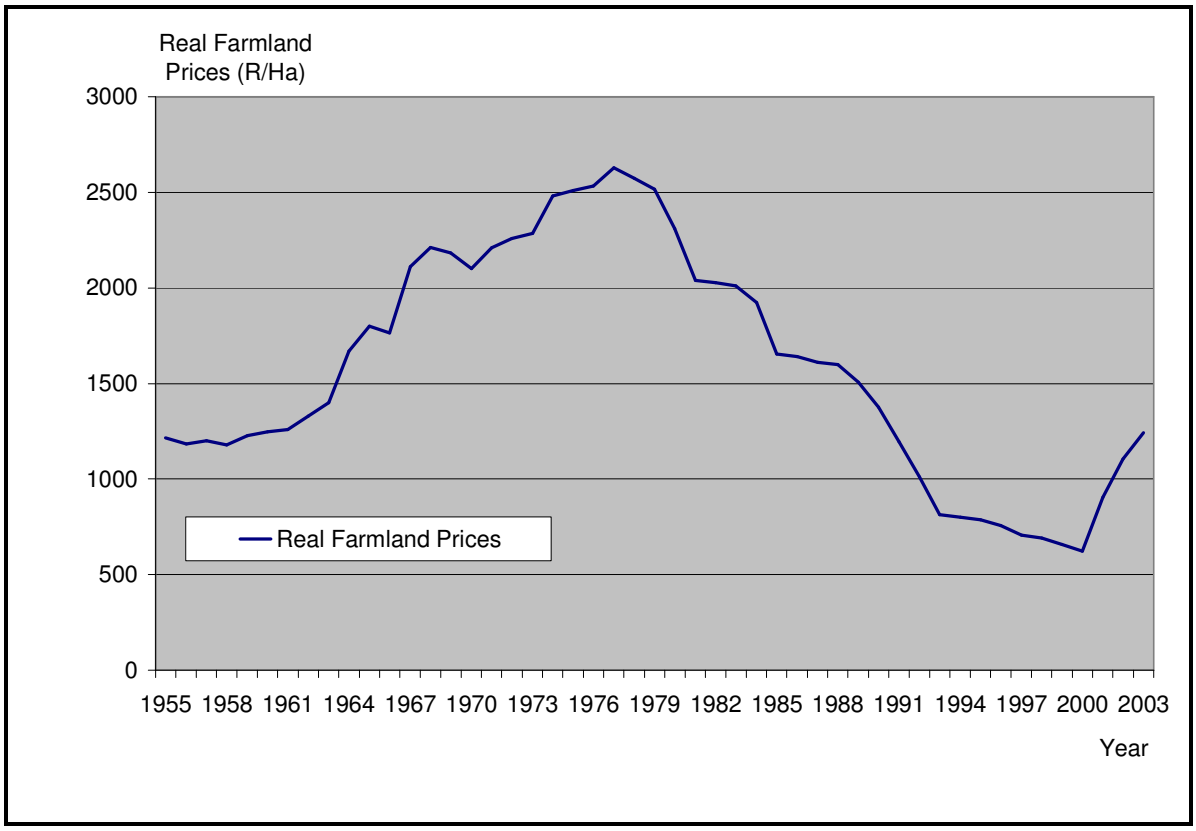

Figure 4.2: Trends in real farmland prices per ha 1955-2003 (2000=100)

In and of themselves, fluctuations in the annual values of a variable will not lead to the conclusion of non-stationarity since a host of other factors can lead to such variability. As has been noted earlier, economic time series of appreciable length and which have been derived from multiple sources and under various assumptions can generally exhibit considerable instability due to the presence of extreme values of outliers, skewedness of data, and unequal variances. Any of these factors can cause the trend in prices to exhibit some instability which will not necessarily translate into non-stationarity. These possibilities were borne in mind in the subsequent handling of the data.

4.3.2 Interest Rate on Debt (rintrd)

Statistics South Africa collects and reports the real interest rate on debts. The study by Van Schalkwyk (1995) obtained this information from the Central Statistical Service (1994). In the South African Monetary system, the ultimate authority for monetary regulation is the Reserve Bank which periodically announces changes in the interest rate chargeable for the use of capital and related activities which have implications for the level and pace of investment in the economy. The extensive database maintained by the Bank provides access to this information. At the same time, Statistics South Africa which inherited the responsibilities of the erstwhile Central Statistical Service, collects this information and stores it in easily retrievable formats. Fresh data for the entire period (1955-2003) was collected from the Standard Bank Intranet (Standard Bank, 2005) and checked against the original data used in Van Schalkwyk (1995). When the nominal data set is adjusted by means of the consumer price index, a series for the real interest rate on debt was obtained as shown in Figure 4.3.

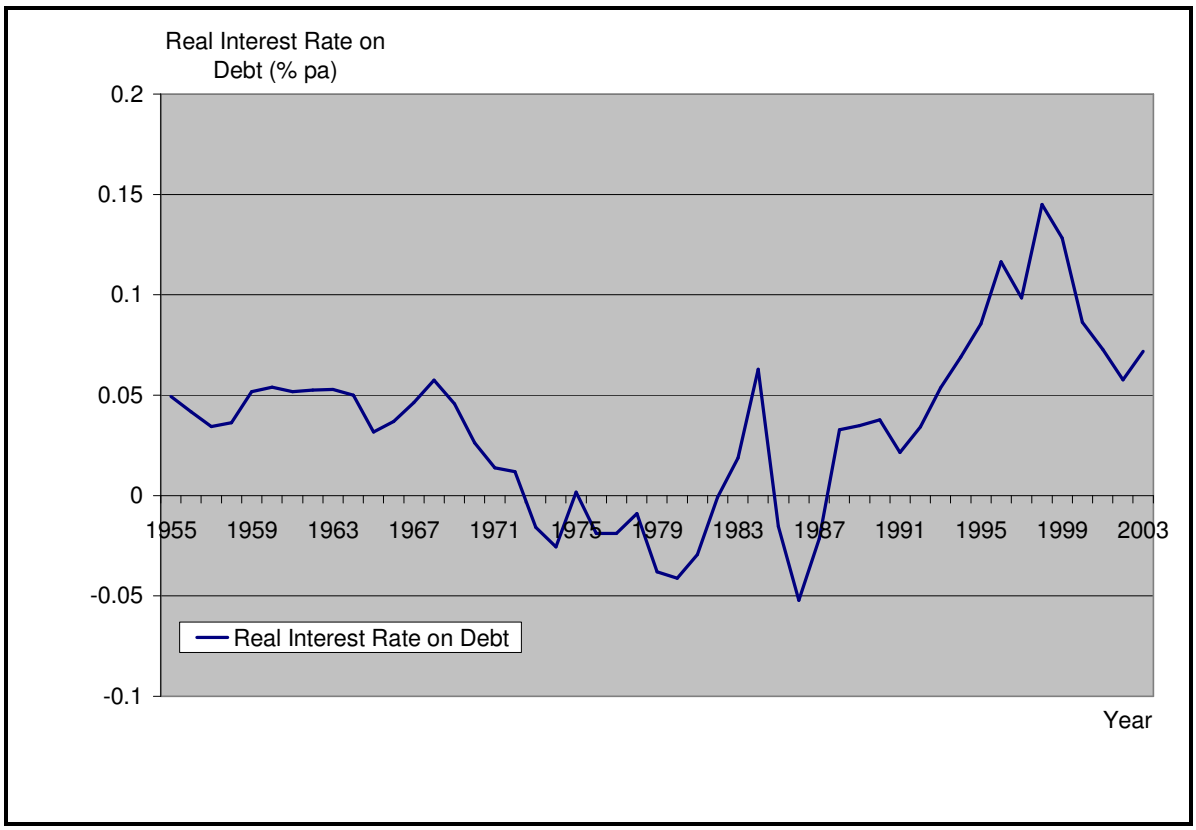

Figure 4.3: Trends in real rate of interest on debt 1955-2003 (2000=100)

The rate of interest is hypothesized to strongly influence the demand for credit for investment purposes and consumption. In recent times, the interest rate on debt has been at historically low levels and the authorities make a link between this and the high demand for land which pushes farmland as well as house prices literally through the roof. The prime rates charged by the commercial banks are the most frequently used indicators and generally measure the cost of private capital in the economy.

4.3.3 Net Farm Income Per Hectare (rnfi)

One of the important data sets maintained by the Directorate of Agricultural Economic Trends is on the net returns to farming. This is one of the major determinants of farmland value (Reynolds and Timmons, 1969; Van Schalkwyk, 1995). Its importance derives from the fact that the value of the farm often has a strong correlation to the stream of expected future returns from the land in question. The consumer price index (CPI) was applied to the data held by the Directorate of Agricultural Economic Trends to obtain

values at constant 1985 prices in the original study (Van Schalkwyk, 1995). The data were then extended to 2003 and by applying the inverse of the CPI to revert the series to the nominal values graphed in Figure 4.4. To rebase the series to 2000, the CPIs for various time periods were spliced to obtain a continuous series for 1955-2003 which was then used to deflate the net farm income to constant 2000 prices.

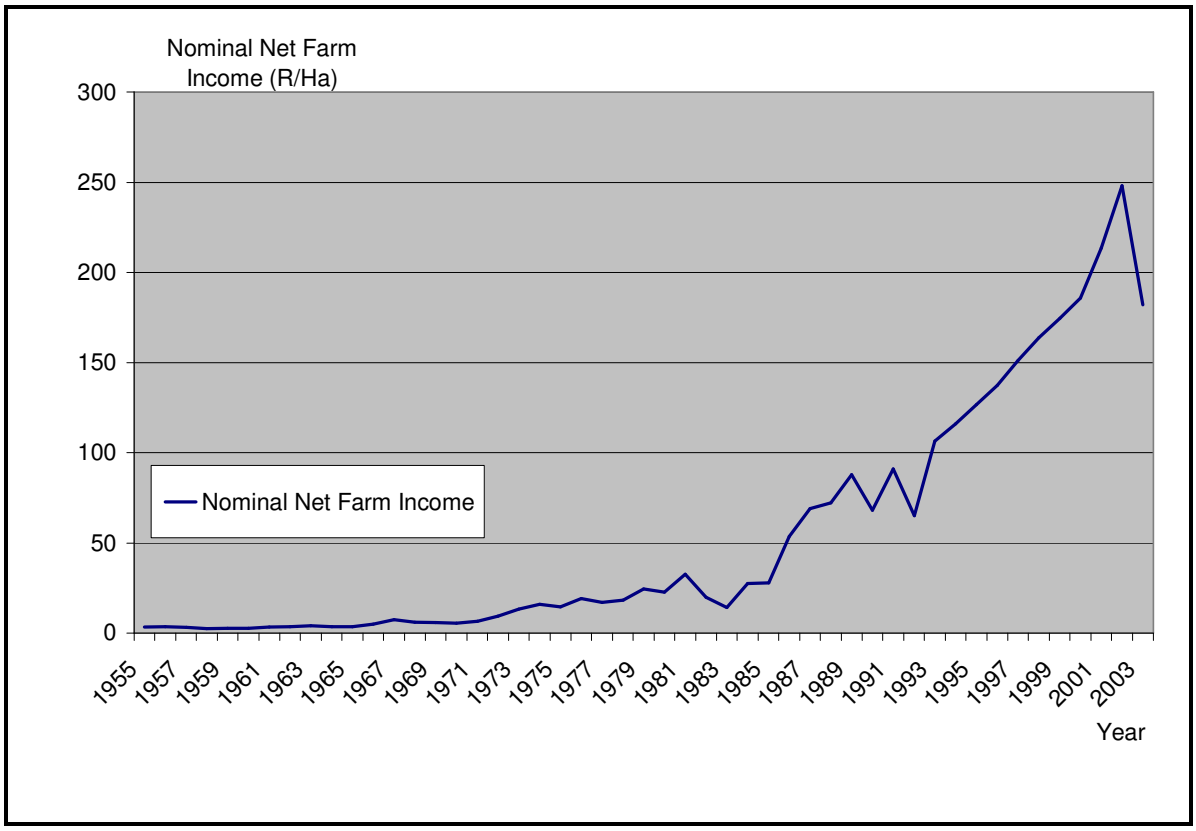

Figure 4.4: Trends in nominal net farm income per ha 1955-2003

Looking at the trend in Figure 4.4 above, it is clear that government support has had considerable impact on the performance of the farm sector over the years. After growing modestly for several years, net farm incomes began to leap upwards from the mid-1980s when government support began to rise astronomically. In the early 1990s, policies initiated to scale down the support to farmers may have accounted for the reduction in the level of net farm income in the period 1991-1993. The droughts of the early 1990s have also been blamed for this decline in net farm income in the 1990s. The climate of uncertainty and pessimism that prevailed among white commercial farmers who were unsure about where the political reforms would take the country probably exerted greater

impact on agricultural investments than did the net farm income during this period. Subsequently, net farm incomes shot up sharply (Figure 4.4) and remained high until about 2001 when it fell quite sharply. What exactly may have generated such a sharp downturn is not clear, but it has been suggested that the strengthening of the Rand exchange rate after the beginning of 2002 may have caused a decline in export receipts and hence net farm incomes in an export-oriented agricultural economy (*Nieuwoudt, 2006).* It is also important to bear in mind that the period coincided with the Southern African food and humanitarian crises that featured prolonged droughts and flooding that began in 2001 (Van Schalkwyk et al., 2005). The available statistics show that for most of the country's principal agricultural commodities, the gross value of production fell sharply during 2002 for instance (Van Schalkwyk, et al., 2005). A recent review by the the Department of Agriculture suggests that this trend in the nominal net farm income is continuing (DoA, 2006).

The net farm income in constant 2000 prices is presented in Figure 4.5. The picture that emerges is one of extreme volatility over the years, especially in the 1960s and 1970s. This is to be expected for a sector operating within the difficult macroeconomic setting of the Apartheid era in the face of sanctions by the international community as well as adverse weather and climatic conditions. This situation also probably reflects the high sensitivity of net farm income to the macroeconomic environment, the policy regime, and natural conditions. In this respect, three periods can be distinguished to attempt an explanation of the observed patterns in the real net farm incomes. The first period starts roughly from the beginning of the observation period up to the early to mid-1980s. This period can be regarded as the "golden age" for white commercial farmers when the level of agricultural support was at its highest. The mid- to late-1980s were marked by a reduction of support measures. In between these two support scenarios, a devastating drought occurred in the early 1990s affecting many countries in Southern Africa.

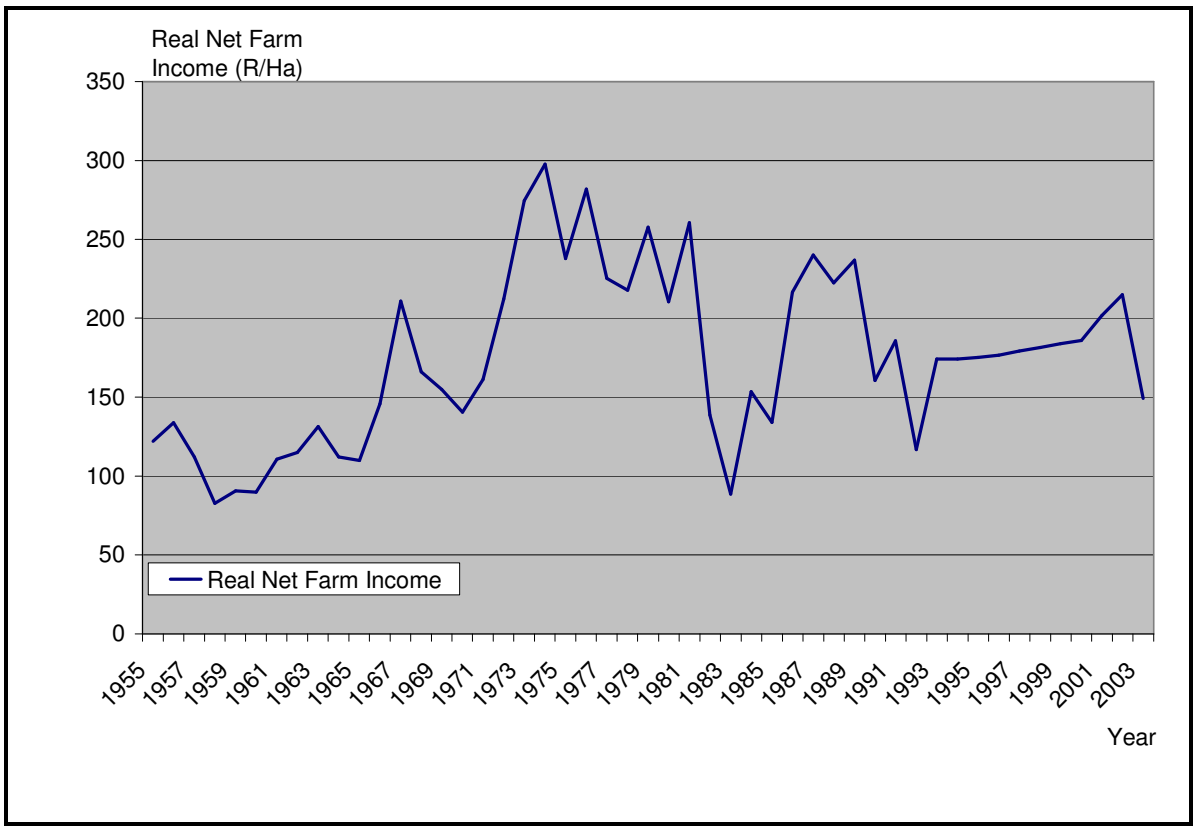

Figure 4.5: Trends in real net farm income per ha 1955-2003 (2000=100)

The lowest point in the level of the real net farm income was attained in about 1983/84 when the droughts were beginning to exert their impacts on farm output. This situation was complicated by political developments in 1985 when countries like the United States and Great Britain joined several other countries and bodies to impose economic sanctions on South Africa (Mujkanovic, 2005). From this time onwards, however, the picture for the farm sector began to look brighter, probably because of the end of the drought. The decline in real net farm incomes in the early 1990s is consistent with the observation above in relation to the nominal values and is possibly explained by the further reduction in the level of government support as part of a programme to restructure the agricultural sector and empower black emerging farmers in the former independent homelands. According to some opinions, there was also a considerable amount of pessimism that prevailed in the years preceding the democratic elections as white farmers remained unsure about the intentions of the in-coming black regime. It is opined that such pessimism may have affected investment levels in agriculture and possibly led to sub-optimal farm planning and management practices with adverse consequences for net farm

incomes. The decline in real net farm income since 2000 must definitely relate to other factors in the South African farming environment as well as external factors. For instance, it has been noted that commodity prices have been going down since the 1990s. This decline has been particularly dramatic for maize which is a major export commodity within the regional market. The cycles of droughts and floods in the region beginning in 2001 may also have contributed to this situation.

4.3.4 Farm Debt Per Hectare (rfdph)

Information on farm debt is regularly updated and reported by the Department of Agriculture in the annual statistical abstracts and other publications. The Directorate of Agricultural Economic Trends maintains such information as real estate debt while the Statistics South Africa records this as farming debts, with some of the historical data coming from the agency's predecessor, the Central Statistical Service (1993 and 1994). Much as it would be useful to model the real debt load, it needs to be recognized that the process would involve a number of simplifying assumptions many of which may not hold good in a general case. It is considered more practical to use the actual level of farm debt which is a directly measurable index for which the Department of Agriculture has ample data going back several years. Figure 4.6 presents the aggregated farm debt at current market prices, while Figure 4.7 presents the farm debt per hectare at constant 2000 prices.

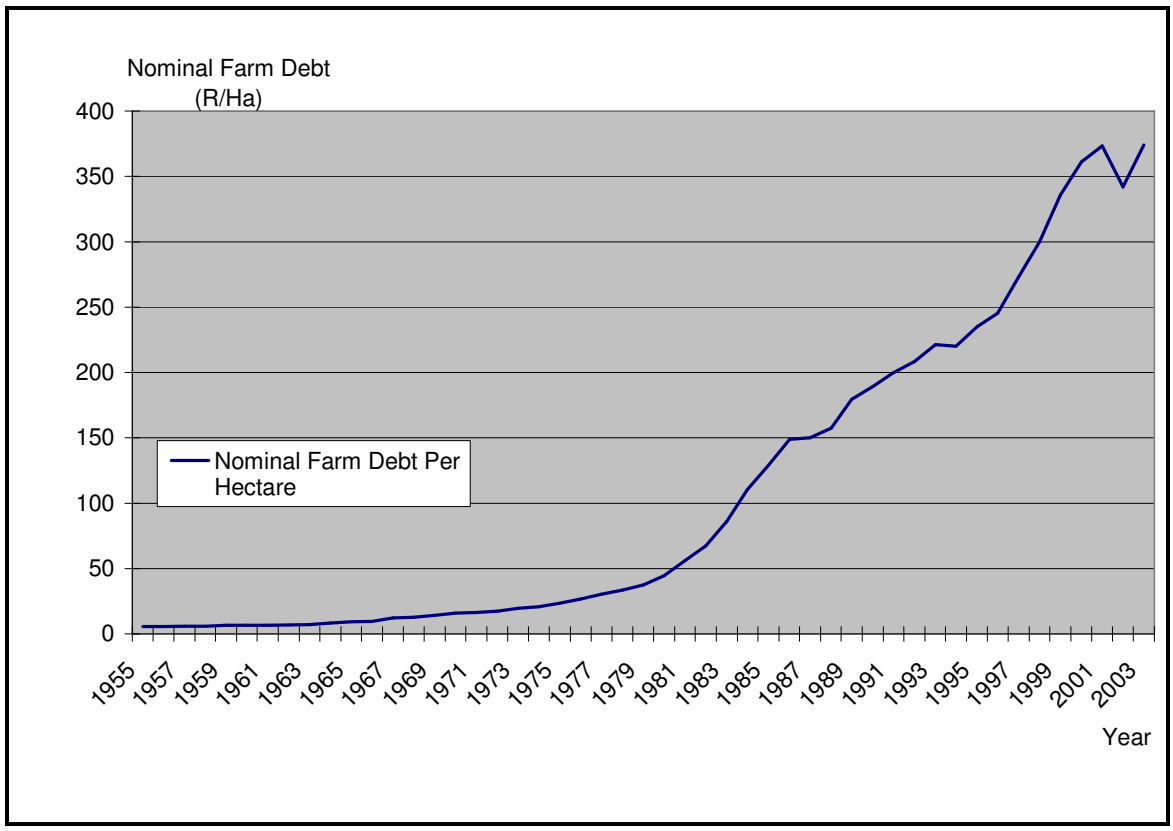

Figure 4.6: Trends in nominal farm debt per ha 1955-2003

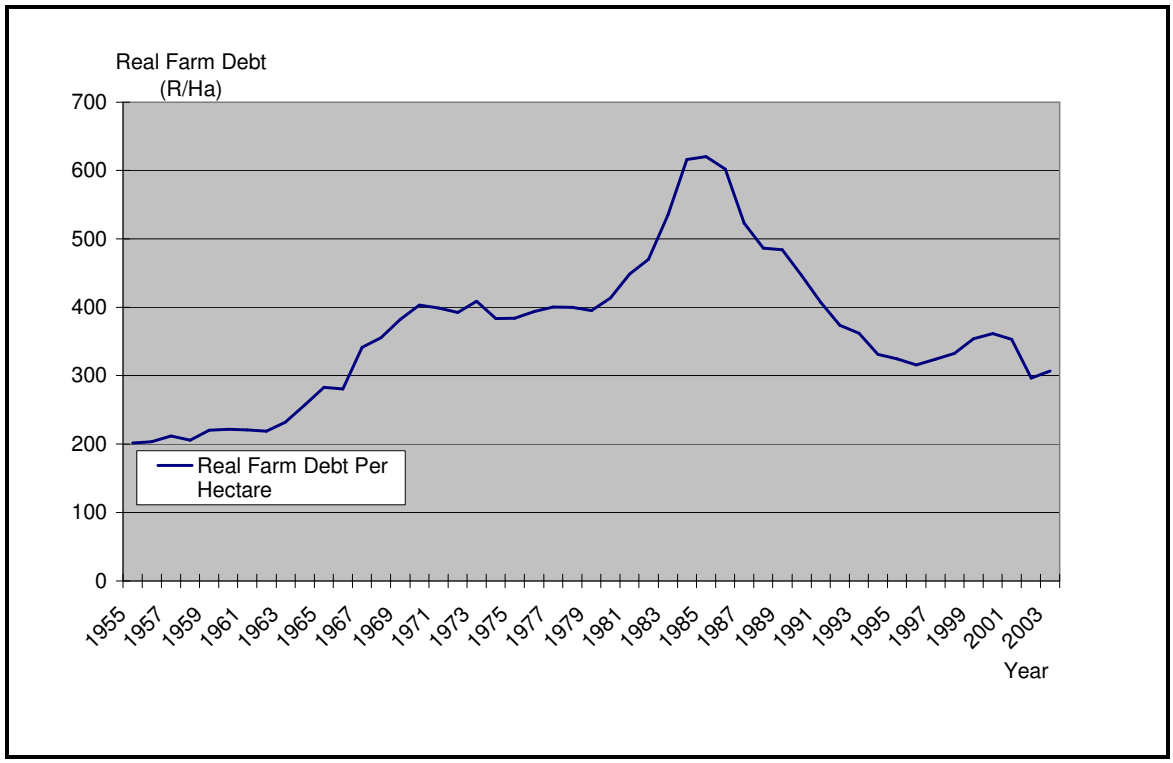

Figure 4.7: Trends in real farm debt per ha 1955-2003 (2000=100)

The level of farm debt is no doubt an important factor in property acquisition, including farm investment and other dimensions of economic participation. It is also an important factor in the level of consumption of goods and services of whatever description. Farm debt is considered here from that point of view and in the light of the historical role of the variable as revealed by the extensive literature review. Whenever the need has arisen to build up capital and scale up production beyond what an individual entity can comfortably accommodate within available means, resort has usually been made on debt accumulation to raise the necessary capital. The literature makes a link between debt accumulation and asset pricing in general and there is also a tendency to trace causation to the level of interest rates and other parameters of the macroeconomic environment.

4.3.5 Foreign Buyers and Investors (rfbsph & rfblph)

This variable is considered a very crucial one in the context of the recent developments in the agricultural land market in the country. It is necessary to derive a means of subjecting the issue of foreigners buying land in South Africa to empirical investigation. This would hopefully provide a more reliable anchor for policy making and remove the subject from the realm of suppositions, speculation, and vague suggestions which have characterized it for sometime. In this regard, this study obtained time series maintained by the South African Reserve Bank on the direct investments by the non-banking sector and are considered a reasonable proxy for portfolio in-flows which will include investments for the purchase of property such as agricultural land.

Incidentally, the Reserve Bank database for this variable (identified by the time series code KBP5548J) started in 1956, one year shy of the starting point of the observation period for this study. Since there was the possibility that fitting the model with zero values for 1955 for this variable could affect the predictive power of the model by yielding misleading parameters, it was decided to seek some basis to provide data for that year. In this regard, two options were considered, namely extrapolating from the available series or seeking direction from the Reserve Bank itself. In respect to the first option of extrapolation, econometric theory provides guidelines on the methodologies for

addressing "missing-observation" problems (Pindyck and Rubinfeld, 1991). Following the guidelines, an OLS regression was run on the entire data set over the 1956-2003 period and the values for 1955 substituted in the resulting equation to allow for a 1955 value to be derived for short-term capital inflows. This procedure yielded a value of R2,194.5 for short-term capital inflows for 1955. But this is clearly unrealistic for various reasons. In the first place, that value exceeds the 1956 value by nearly 300% which is higher than any single annual change in the variable, or indeed any other variable in the data set. There was also no known economic or political development in those two years that could justify a change as dramatic as that. The alternative was to seek guidance from the Reserve Bank. The responsible official at the Research Department of the Reserve Bank and specialist analysts/econometricians advised that the value for 1955 could have been close enough to the one for 1956 to justify using the same (Swart, 2006; Mandeya, 2006). According to Pindyck and Rubinfeld (1991), it is perfectly legitimate to assign values for missing observations "…if some *a priori* knowledge is available". In line with this convention, therefore, the value for 1955 is kept at the same level as those for 1956 for the both short-term and long-term capital inflows.

Figure 4.8 presents the trends in short-term capital inflows while Figure 4.9 presents the trends in long-term capital inflows. Both variables are presented at 2000 constant prices. Given the differences of opinion about which of the two concepts more closely mirrors the foreigners' purchase of farmland in South Africa, it was decided to introduce both of them in the model and draw conclusions about their relative weights based on the outcome of the estimation. It was also considered that, in and of themselves, the variables would have some influence on the overall economy and therefore indirectly influence farmland prices.

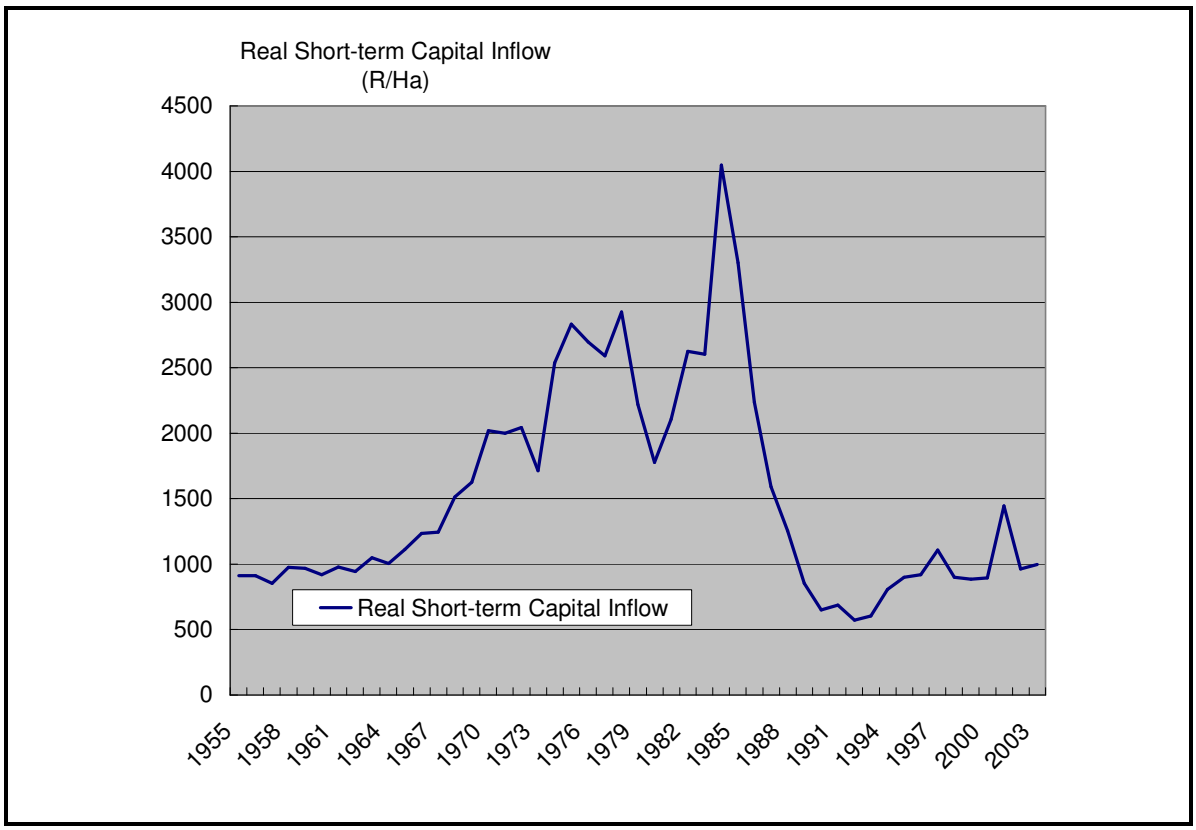

Figure 4.8: Trends in short-term capital inflow per ha 1955-2003 (2000=100)

In the case of short-term capital inflows, Figure 4.8 shows that the flow grew slowly during the 1960s and 1970s and then began to grow a little faster in the 1980s up to 1985 when it seemed to have fallen off sharply up to 1991. From then, it began to grow steadily again up to quite recently, probably in the late 1990s when it seemed to start falling off again. However, since 2001 it has again started to rise as Figure 4.8 suggests.

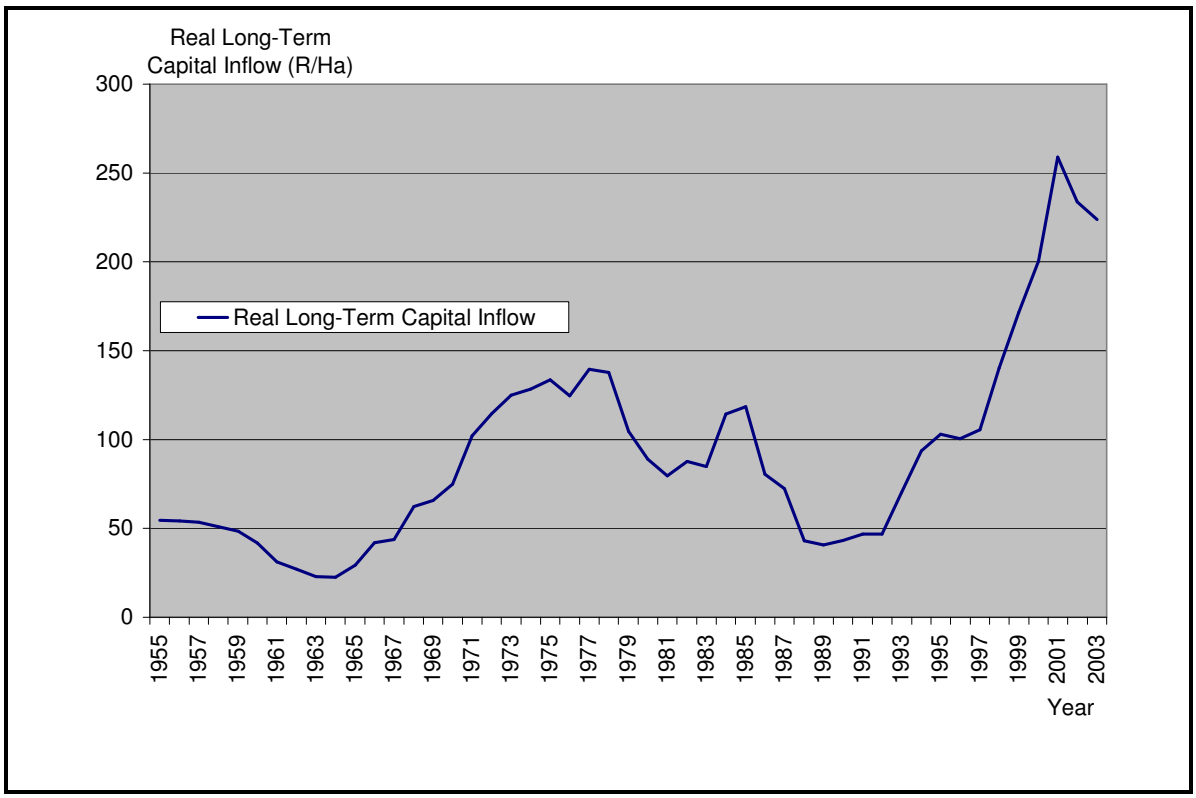

Figure 4.9: Trends in long-term capital inflow per ha 1955-2003 (2000=100)

4.3.6 Gross Domestic Product per Capita (rgdpc)

This variable was considered important because it measures the health of the economy on the one hand and the ability of individuals to pay for assets, on the other. There is also every likelihood that the variable can influence expectations about the future. Such expectations will in turn determine the price level of assets. When the GDP, as the monetary value of all the goods and services produced in the economy in a given year, is trending upwards over time, there is generally increasing confidence in the economy as a whole and for the specific sectors contributing most to the growth, if such information can be gleaned easily. Signals about such prospects are what investors look out for in making decisions one way or the other. The possibility that increasing demand for farmland can be an outcome of a perception that the farm sector is contributing to a growing economy can produce effects that may push prices of farmland upwards. GDP and the rate at which it is changing can also reflect the extent to which use of land for non-agricultural purposes is important. To this extent, particularly because of its

somewhat omnibus character, GDP is considered crucial for the model and the rate at which it changes will closely measure how well or otherwise, the economy is faring. Figure 4.10 presents the trend over the 1955-2003 period.

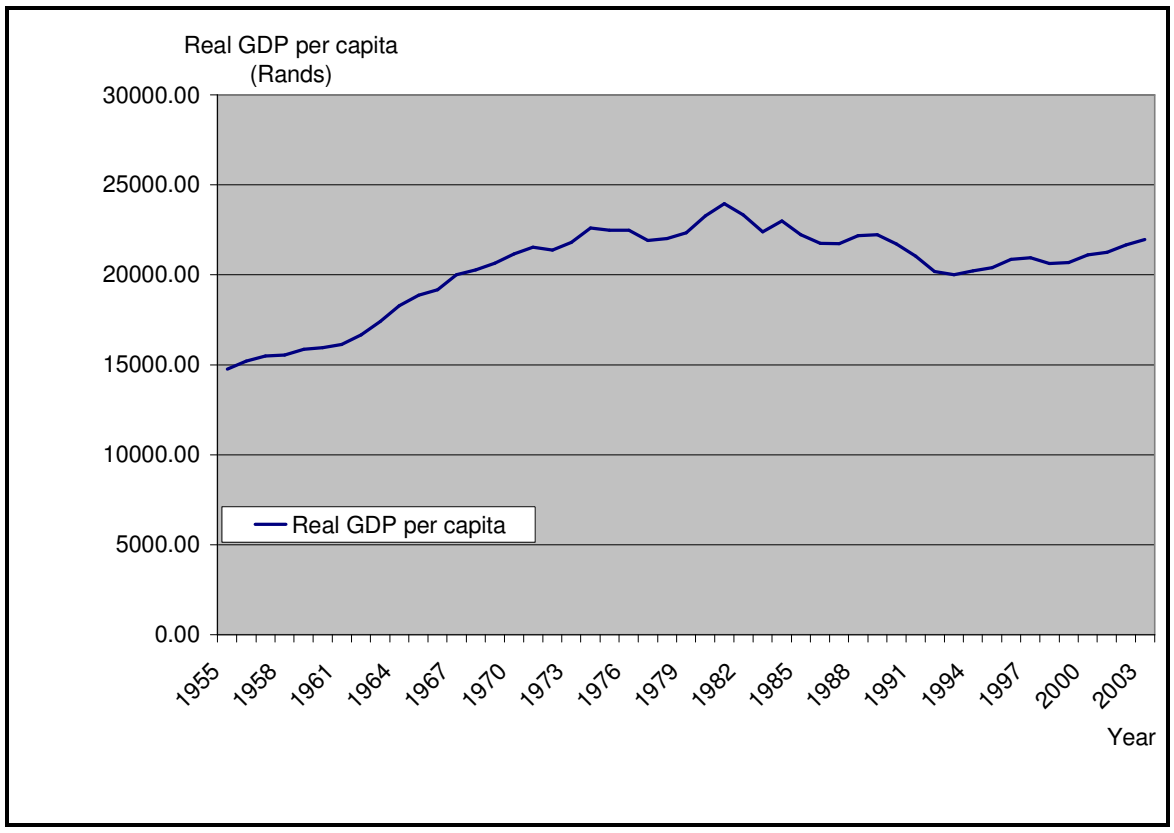

Figure 4.10: Trends in real GDP per capita 1955-2003 (2000=100)

4.3.7 Rate of Inflation (infl)

The consumer price index provides a good measure of inflation rate (Van Schalkwyk, 1995). Information on this variable is updated regularly by the Reserve Bank of South Africa, Statistics South Africa, and a number of business periodicals that are widely available and easily accessible. The extension of the series to 2003 was done on the basis of information from these sources. Figure 4.11 presents the trend in rate of inflation over the years. The literature makes a link between the rate of inflation and the variations in farmland prices. Van Schalkwyk (1995) equally found this to be true for South Africa. But such a link has not been made previously in the context of a cointegration analysis for South Africa in the era of agricultural restructuring and macroeconomic liberalization.

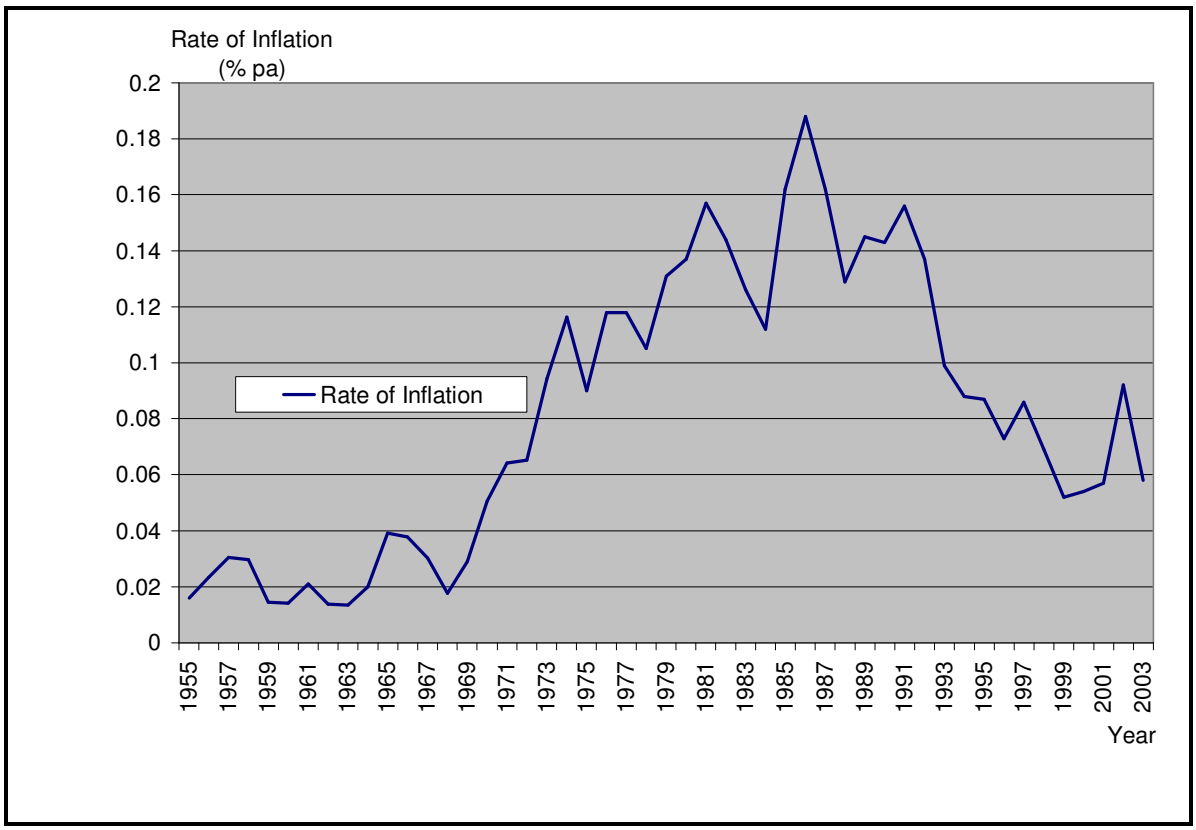

Figure 4.11: Trends in rate of inflation 1955-2003

4.3.8 Exchange Rates (rsaus & russa)

The exchange rate is a means of expressing the value of one currency in terms of another currency. As an expression of price, it represents how much of one currency is required to purchase one unit of another currency. To that extent, it will be expected to play a role in asset pricing, depending on how costly, or otherwise, the domestic currency is at any one time. This will also be particularly useful where foreigners play an important role in the market and use earnings from other countries to make purchases within South Africa. Since the Effective Exchange Rate measures the local currency in terms of a basket of currencies of major trading partners of South Africa, it is considered a more useful measure to capture the multinational character of the foreign buyers. However, the Reserve Bank of South Africa's data base maintains data on this variable only from 1971 and there is hardly any easily accessible basis for determining the values of the missing data from 1955-1970. But information on the exchange rate between the rand and the US

dollar exists in a form that can allow the updating of the series available from the Reserve Bank database.

For instance, Van Der Merwe (1996) provides a comprehensive historical account of foreign exchange developments in the country from the colonial era, through the establishment of the Bretton Woods Institutions to the introduction of the flexible, quasi-market determined rates of today. Such information was used to update the available series to produce a complete series from 1955. The other reason the US dollar exchange rate is considered appropriate is the popularity of the US dollar for conducting all manner of transactions in the country. Even in cases where multilateral transactions are involved, it is known that the US dollar has remained the international currency of choice. The trend in this variable is presented in Figure 4.12 for the rand denominated exchange rate while in Figure 4.13 the information is presented for the dollar denominated exchange rate between the two currencies. In terms of notation used in the model, when the rand-denominated rate was used the notation employed was RSAUS, and when the dollar-denominated rate was used, the notation employed in the model was RUSSA.

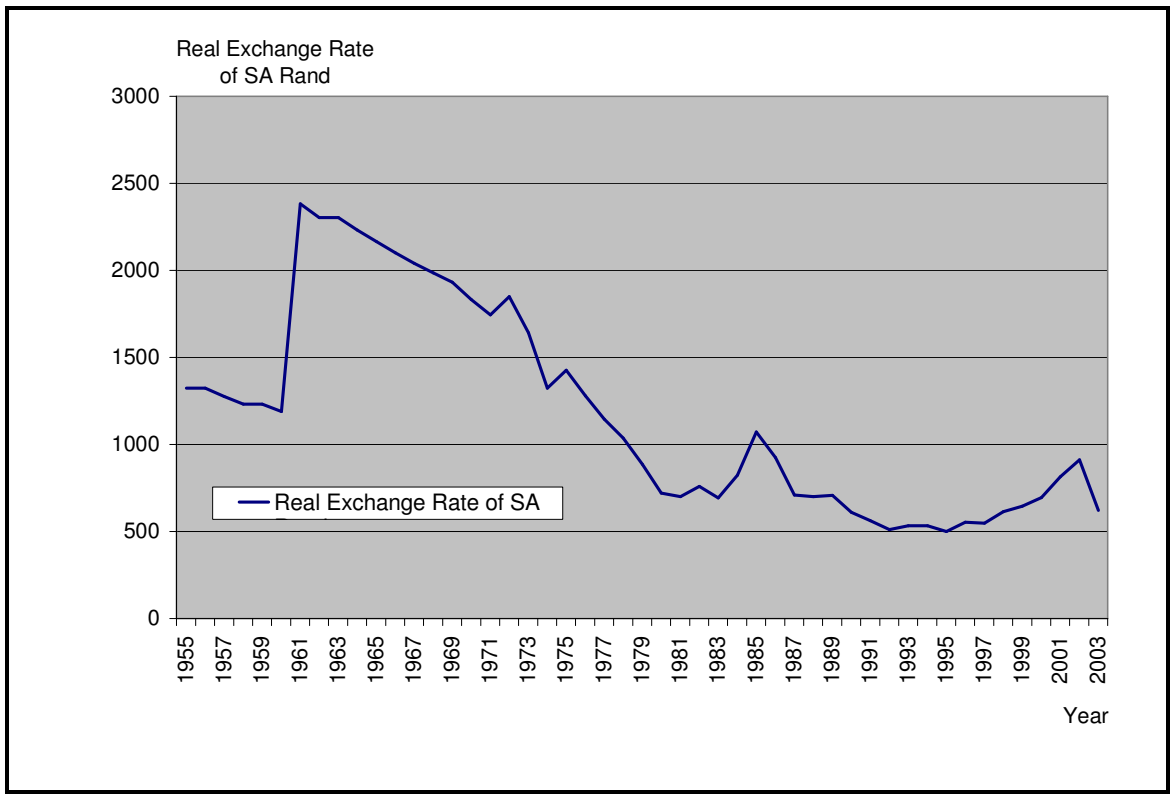

Figure 4.12: Trends in real exchange rate Rand-US Dollar (2000=100)

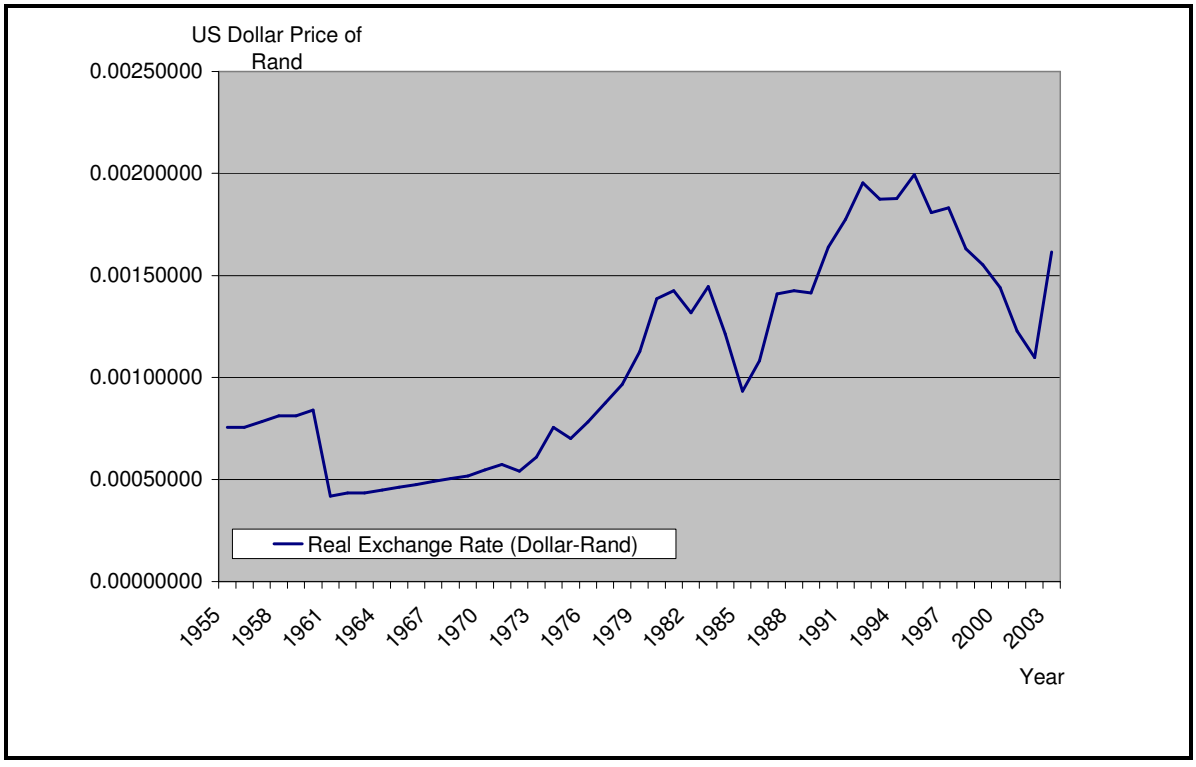

Figure 4.13: Trends in real exchange rate US Dollar-Rand (2000=100)

4.3.9 Land Transfers to Black Population (lndtr)

This variable was included to capture the changes in land ownership patterns in the country following the inception of democratic governance and the land reform process which is aiming to redistribute land more equitably across the population. The details of the land question have already been well-covered in Chapter 2 and elsewhere. But data on actual transfers are still not available in a form that can be easily obtained and analyzed at the national level. When such information becomes available, it will be useful to integrate it to the existing data on land transfers within the commercial farm sector and examine changes between the major races in relative access to land. At this stage, it is only possible to use a dummy which assigns a zero (0) value to periods prior to the implementation of land reform in about 1995/96 and a value of 1 to the period from the inception of land reform to date. Although the programme was suspended temporarily in 1999 to allow for a programme review in the light of dissatisfaction with the pace of the reform process, it does not improve the quality of the data to assign a different dummy value to the post-1999 period when the LRAD was introduced to replace SLAG. Both periods were therefore treated as similar to the extent that land transfers to the black population were taking place. Figure 4.14 presents the results obtained when the resulting trend is graphed. As the figure shows, the curve of the land transfers to the black population remained a horizontal line parallel to the X-axis until it kinked in 1995.

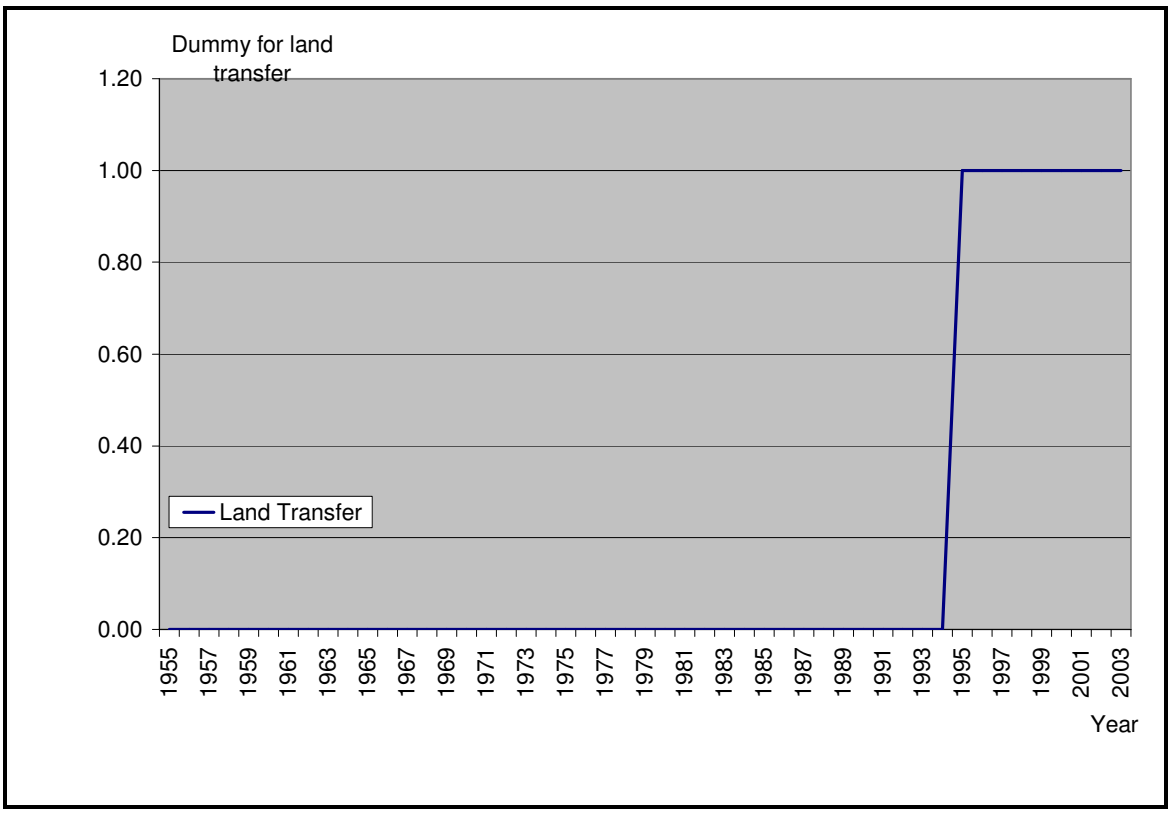

Figure 4.14: Trends in land transfers to black population 1995-2003

4.4 Structure of the Model

The interest here is to derive a basis for making valid predictions about agricultural land prices when the policy environment is undergoing rapid change occasioned by a commitment to achieve re-distributional equity and right past wrongs within a deliberate context of redress, elsewhere known as "affirmative action". The model is essentially going to answer the question: what are the factors that determine the level and direction of agricultural land prices and in what ways do they exert their influences? In the specification of the model, this means that the land price variable will be entered as the dependent variable whose variations will be explained by a set of independent variables drawn from the listing above. Basically, the model will attempt to establish a relationship such as the following:

rlph = f(rintrd, rnfi, rfdph, rfbsph, rgdpc, infl, , rfblph, , rsaus/russa, lndtr) ----------(4.1)

In a highly simplified framework, we will expect land price to be sensitive to the expected rate of return in the year of purchase. The expected rate of return on farming operations will be influenced by a number of variables, including capital gains, rate of inflation, net farm income, interest rates, etc. In our simplified framework, let us assume for a start that the sum of income realized, plus percentage capital gains determine the expected rate of return, and using the following notations to depict the three key measures as follows:

P_t = real price of land at the beginning of year *t;*

R_t = real net farm income (as a measure of land productive power of the land) earned in year *t;*

K = required rate of return (being a constant percentage) from the land.

If we denote the expected rate of return as $Z_{t,}$ a simple equation can be used to relate these variables as follows:

$$Z_t = \frac{R_t}{P_t} + \frac{P_{t+1} - P_t}{P_t} \quad \text{----------(4.2)}$$

The condition for competitive equilibrium in the land market is that expected rate of return must equal the required rate of return as depicted by:

$$\mathrm{E_t}\left[Z_t \middle| \phi_t\right] = K \quad \text{----------(4.3)}$$

where ϕ_t is an information parameter available at time *t* and which indicates to investors or potential land buyers what the future rates of return might be. Z_t by itself represents the market fundamentals, or the variables that are intuitively hypothesized to determine the price of the asset given a perfectly competitive environment defined by perfect foresight and insights, freely accessible markets where restrictions are non-existence (absence of race-based allocative policies such as existed under the Apartheid era). Later on, we shall introduce the other elements of the market fundamentals as identified in the literature and formulated as part and parcel of the study objectives and motivation.

Continuing with our simplified scenario, agricultural land price, $P_{t,}$ is represented by the following:

$$P_{t,} = (1+ K)^{-1}E[P_{t+1} + R_t|\phi_t] \text{ ----------(4.4)}$$

What equation (4.4) is saying basically is that the price of the agricultural land in time *t* bears a straightforward relationship with the product of the inverse of its yield (that is the one period compounding of its required rate of return) and the sum of its value in one year's time and net income it creates in the present year. The equation incorporates the element of capitalization of net farm income into future price of the land as would be elaborated below. In order to capture all the determinable factors, we assume that there is no speculative element so that if there was indeed any, it would be incorporated in the residual term. Under that assumption therefore, an equation of the land price determination that reflects present value rule can be specified as follows:

$$P_{t,}= \sum_{j=1}^{\infty}(1+K)^{-j}E_t\left[R_{t+j}\right] \text{ ----------(4.5)}$$

Equation (4.5) suggests that land price is the expected present value of future streams of our measure of the farm net income (which could be rent whether or not a land rental market exists), compounded over the number of years during which those streams accrue. Such earning from a farm, be it net farm income or rent, can be expected to flow at the same level in perpetuity, a situation which can be presented in the following form:

$$E_t\left[R_{t+j}\right]= E_t\left[R_t\right] \text{----------(4.6)}$$

for all j>0.

The situation in equation (4.6) means that the price of agricultural land can simply be determined by the value of the net farm income and the rate at which it is being capitalized, that is:

$$P_t = CR_{t-1} \text{ ----------(4.7)}$$

This formalizes the influence of the capitalization rate, *C,* which is exerted in terms of the following simple relationship:

$$C = \frac{1}{K} \text{ ----------(4.8)}$$

In South Africa, as elsewhere, it is now well-known that expected net farm income has a tendency to be capitalized into farmland prices (Van Schalkwyk, 1995). A long-run equilibrium situation would be that both variables will tend towards some kind of convergence in which case we obtain a relationship of this nature:

$$P^* = CR^* \text{----------(4.9)}$$

where P^* and R^* represent the long run equilibrium price and net farm income, respectively. At the point of long run equilibrium, it is reasonable to assume to a unit change in the net farm income would lead to no more than a unit change in the price of farm land, suggesting a unitary elasticity.

But we know from economic theory that land price will be determined by a set of market fundamentals and some speculative elements (Lloyd, Rayner and Orme, 1990). Let the market fundamentals be represented by the notation M_t, while the speculative elements are represented by the notation S_t.

$$P_t = M_t + S_t \text{----------(4.10)}$$

where,

$$M_t = \delta \sum_{j=0}^{\infty} \delta^j E_t\left[R_{t+j}\right] \text{----------(4.11)}$$

which sums up all the expected future streams of the independent variable, namely the net farm income (RNFI) which we have thus far considered as the sole market fundamental. Of course, this is a simplification to enable us to develop the basic framework. The remaining elements of the market fundamentals can be introduced into the model eventually. As hypothesized, agricultural land prices in South Africa, in the current policy scenario featuring land redistribution, land restitution and land tenure reform, being implemented under a market-assisted land reform programme, and other aspects of the deregulation of the agricultural sector, the variables listed in equation (4.1) above are important.

In the case of the speculative element, S_t, we have

$$S_t = \gamma_t\left(\frac{1}{\delta}\right)^t \text{----------(4.12)}$$

which shows the speculative element as involving a relationship between the rate of discount and some random expectation about the future and further possesses the property

$$E_t[S_{t+1}] = (1+r)S_t \text{----------(4.13)}$$

which can also be written as

$$S_{t+1} - (1-r)S_t = w_{t+1} \text{----------(4.14)}$$

In equation (14) above, the term w_{t+1} is a random variable which satisfies the condition that

$$E_{t-j}[w_{t+1}] = 0, \text{ for all j } \geq 0.$$

What we can conclude from equations (4.10) to (4.14) is that, at any one time, the going market price of agricultural land may diverge from what can be specifically attributed to

the observable market fundamentals by an amount accounted for by non-observable elements arising mainly as a result of speculations. For the most part, these speculative elements are fueled by perceptions concerning the trend in prices, earnings, etc. According to Lloyd, Rayner and Orme (1990), expectations about capital gains and losses are some of the variables, if they can be quantified, that can be included as speculative components of the determinants of farmland prices.

Given all the foregoing, we can then re-write the basic relationship between agricultural land prices and its determinants as follows:

$$P_t = \delta \sum_{j=0}^{\infty} \delta^j E_t\left[R_{t+j}\right] + \gamma_t \left(\frac{1}{\delta}\right)^t \text{ ----------(4.15)}$$

As can be seen clearly, equation (4.15) incorporates both market fundamentals and the speculative elements.

The basic economic law of demand can be evoked here, to digress a little before resuming with the model specification. As is obvious from the intuitive knowledge about the nature of the variables, their impact will be mostly on the demand side of the model. For instance, net farm income directly impacts on farmer's or prospective landowner's expectation about the future and the potential for gain in land ownership. Prior knowledge about the capacity of the farm in terms of productivity provides the single most powerful motivation for investment. The same goes for capital gains, rate of interest which acts through its impact on the demand for debt to finance investment. The rate of inflation, as is well known, impacts on the real value of current income by affecting the general price level. In that case, inflation determines the content of a given basket that can be commanded by a given level of income.

It is possible then to incorporate the various determinants of demand into equation (4.15) and elaborate an estimable econometric model. But before going on to that, we need to say one or two things about the formation of expectations given its significance in the

speculative side of the land price question. Three genres of expectation models have been well-discussed in the literature and reviewed by Lloyd, Rayner and Orme (1990). These are the Adaptive Expectations (AE), Naïve Expectations (NE) and Rational Expectations (RE).

A modified version of equation (15), expressed as an econometric model with an error term μ_t can be used to illustrate these expectations models

$$P_t = \delta E_t \left[R_t + P_{t+1}\right] + \mu_t \text{ ----------(4.16)}$$

In terms of the Adaptive Expectations Model, equation (16) can be re-written as,

$$E_t\left[R_t + P_{t+1}\right] = \frac{\alpha\left(R_{t-1} + P_t\right) + v_t}{1-(1-\alpha)L} \text{ ----------(4.17)}$$

where,
α is the coefficient of expectations
L is the lag operator, and
v_t is a random residual term. It is assumed that this residual is not correlated with the error term of the specified equation (4.16).

If we then substitute equation (4.17) into equation (4.16) and re-arrange the terms, we can obtain the following expression:

$$P_t = \frac{1}{1-\delta\alpha}(1-\alpha)P_{t-1} + \frac{\delta\alpha}{1-\delta\alpha}R_{t-1} + \frac{1}{1-\delta\alpha}\left(\delta v_t + \mu_t - (1-\alpha)\mu_{t-1}\right) \text{ ----------(4.18)}$$

Equation (4.18) is telling us that the price of agricultural land is related to its past period level and the past period levels of a number of market fundamentals (such as the net returns on the farm investment – e.g. the net farm income, etc) and a range of random elements such as the possibility of capital gains or losses, etc.

The other genre of expectations is the Naïve expectations. In some way, they can be seen as a special case of the case illustrated in equation (4.18). In this case, the coefficient of expectations, α, is taken to be equal to unity (α = 1), a situation that is more related to a state of relatively more complete information about the future trends. If we set α =1 in equation (4.18), therefore, we can obtain a relationship of the type:

$$P_t = \frac{1}{1-\delta}\left(R_{t-1} + v_t\right) + \frac{\mu_t}{1-\delta} \text{ ----------(4.19)}$$

which means that,

$$P_t = \frac{1}{r}R_{t-1} + \varepsilon_t \text{ ----------(4.20)}$$

Suggesting that agricultural land price in the current year can be completely explained by the past period level of its yield (net returns) in relation to the going discount rate in real terms, and an error term, ε_t that is serially uncorrelated.

The third expectations model examined is the rational expectations model. This model makes the assumption that when all the returns and income flows to the farm are expressed as a percentage of the current year price they will equal the real discount rate which is a constant term. This relationship can be expressed notationally as follows:

$$\frac{E_t\left[P_{t+1}\right] - P_t + E_t\left[R_t\right]}{P_t} = r \text{ ----------(4.21)}$$

where *r* is the constant real discount rate in time period *t.* It is also possible to express this form of rational expectations in terms of:

$$P_{t+1} - E_t\left[P_{t+1}\right] = e_{t+1} \text{ ----------(4.22)}$$

Again, e_{t+1} is serially uncorrelated. The expression is saying that the asset price in the next period, less its expected value, gives an error term which defines the expectations element in the consumer's attitude or perceptions about the future period.

Given equation (4.22), the rational expectations model can be re-written as:

$$P_t = \delta^{-1} P_{t-1} + e_t - E_{t-1}[R_{t-1}] \text{ ----------(4.23)}$$

which simply mirrors what was observed earlier in terms of the reliance on the past information for forming expectations about the current level of prices in the land market. Within this context, it is also possible to model the farm net returns separately as:

$$R_t = \phi + \sum_{i=1}^{n} \beta_i R_{t-1} \text{ ----------(4.24)}$$

In that case, the expression we developed for the previous period expectation about the level of the farm returns can be transformed somewhat. We can do this by taking elements of the expectation about returns in equation (4.21) and replacing them with the ordinary least squares (OLS) estimate of the last period returns derived in equation (4.24) above. This procedure will produce the following expression:

$$P_t = \delta^{-1} P_{t-1} - \hat{R}_{t-1} + n_t \text{ ----------(4.25)}$$

where n_t represents another serially uncorrelated error term. This is a weakly rational expectation model.

Both the adaptive expectations and rational expectations models can be used to illustrate the possibilities of feedback mechanism within the present value model for the purposes of agricultural land pricing.

Taking the adaptive expectations model first, we revisit equation (4.18) which is the present value model incorporating this form of expectations about land prices. Re-writing equation (4.18) as a constrained error correction model provides us with the possibility to access information about the previous period. As will be recalled, equation (4.18), that is the adaptive expectation model, relies on previous period price levels and levels of earnings and other market fundamentals to form an expectation about current and future prices of agricultural land. In that case, equation (4.18) can be re-written as:

$$\Delta P_t = \frac{-\alpha(1-\delta)}{1-\delta\alpha} P_{t-1} + \frac{\delta\alpha}{1-\delta\alpha} \Delta R_{t-1} + \frac{\delta\alpha}{1-\delta\alpha} R_{t-2} + \varepsilon_t \text{ ----------(4.26)}$$

which invariably means that,

$$\Delta P_t = \frac{\alpha}{1-\alpha+r} \left[\Delta R_{t-1} - \left(rP_{t-1} - R_{t-2}\right)\right] + \varepsilon_t \text{ ----------(4.27)}$$

In the case of the rational expectations model, we again go back to the weakly rational expression developed in equation (4.25) above. By re-writing in error correction terms we obtain an expression that tells us what will happen to agricultural land prices on the basis of information based on expected future earnings and behaviour of other market fundamentals. In this respect, equation (4.25) can be re-written as:

$$\Delta P_t = rP_{t-1} - \hat{R}_{t-1} + \varepsilon_t \text{ ----------(4.28)}$$

In the words of Lloyd, Rayner and Orme (1990), equation (4.28) "feeds forward" by relying on past trends to provide insight into the future trend of the price of agricultural land.

An estimable form of the above equation can be presented below to denote the drift of the variables:

$$\Delta P_t = \alpha + r\beta P_{t-1} \Delta R_{t-1} \varepsilon_t \text{ ----------(4.29)}$$

where:

α is a constant term denoting drift of the variables,

$\beta = 1$, and

ε_t is an error term.

In this case where P_t is non-stationary, and the variances and means are non-constant, the variances may in fact become infinite such that any stochastic shock may not return to a proper mean level. The most commonly encountered non-stationary series is the *random walk*, in which, as in equation (4.29) above, the error term has zero mean, constant variance, and zero covariance.

As highlighted in the review in Chapter 3, two types of tests can be performed on equation (4.29) to establish stationarity or otherwise, as follows:

$$\Delta P_t = \propto + \delta P_{t-1} + \varepsilon_t \text{ ----------(4.30)}$$

In equation (4.30), whether or not stationarity has been achieved can be established by performing the Dickey-Fuller (DF) test. The coefficient δ resulting from the Ordinary Least Squares (OLS) regression of the non-stationary series, constituting the differencing procedure, is subjected to the *t*-statistic test of significance to determine whether or not the series has become stationary at the end of the differencing procedure.

The alternative test proposed by Engle and Granger (1987) is illustrated by equation (4.31) below and is a modification of the DF test and aptly described as the Augmented Dickey-Fuller (ADF) statistics. The ADF, like the DF, is also based on the *t*-statistics. The ADF test differs from the DF test to the extent that the lag length *k* chosen for the test ensures that the error term ε_t is empirical *white noise,* which is completely stationary

with zero mean, constant variance and zero covariance between the lagged values of the residuals:

i.e. $\mu_{\varepsilon_t} = 0$; $\sigma^2 = cons\tan t$; and $\mathrm{cov}(\varepsilon_t, \varepsilon_{t-k}) = 0$, for all $k \neq 0$

Given the above, the ADF test will thus involve the following regression:

$$\Delta P_t = \propto_0 + \delta P_{t-1} + \sum_{t-1}^{k} \beta \Delta P_{t-1} + \varepsilon_t \text{ ----------(4.31)}$$

Once the stationarity status has been established, the estimation proceeds to test the following relations, depending on whether we are dealing with bivariate or multivariate systems:

$$W_t = Y_t - AX_t \text{ ----------(4.32)}$$

where W_t is a random error term that measures the departure of the linear relationship between Y_t and X_t from equilibrium, and,

A is a co-integrating parameter which defines the nature of the relationship between Y_t and X_t.

The co-integrating parameter can also be viewed as a "scaling factor" to the extent that it shows also by how much the two series move relative to each other. In a multivariate system, a series of cointegrating parameters will be obtained by the same process to perform similar scaling functions. Equation (4.33) below shows what we can expect in linear combination of three co-integrated data series

$$M_t = \propto_0 + \beta_1 \ln X_t + \beta_2 \ln Y_t + \beta_3 \ln Z_t + \varepsilon_t \text{ ----------(4.33)}$$

where

$X_t \sim I(D_x)$

$Y_t \sim I(D_y)$ and

$Z_t \sim I(D_z)$

The error correction representation based on the above would then be:

$$\Delta Y_t = \beta \Delta X_t - y\left(Y_{t-1} - AX_{t-1}\right) + \varepsilon_t \text{ ----------(4.34)}$$

where ε_t is NID $\left(0, \sigma^2\right)$. Here, the first differences of the variables are allowed to interact with their present and past values. Equation (4.34) is easily the simplest error correction representation where the distributed lag structure of the two series is also of order one. The important condition established by Engle and Granger (1987) that all terms in an error correction model are stationary (i.e *I(0)*), means that this model will almost completely and efficiently estimate the short run parameters which tell us the nature of the short run dynamic process that leads to the equilibrium state suggested by co-integration. The next step is to employ the residual (error) terms from equation (4.34) as an error correcting regressor to capture the short-run dynamics.

4.6 Chapter Summary

This chapter was devoted to a detailed discussion on the possible variables to be employed in modeling trends in agricultural land prices in South Africa, drawing ample lessons from international experience. The chapter provided a brief description of the current socio-economic settings and policy environment as well as local and international/global political and security developments that impact on South Africa given its current openness. Against that background, the chapter enumerated the key variables which have emerged from previous scientific research, conferences, seminars, workshops, and a wide range of informal settings that can be broadly classified as "corridor talk" but nonetheless must be taken seriously in the light of their intuitive appeal. By means of appropriate graphs, the variables were described in some detail.

The chapter then specified the theoretical model for the study based on the present value model which was described. In view of the *a priori* decision to apply the co-integration techniques and error correction mechanism as a way of overcoming the inherent instability in economic time series, the chapter developed the model structure within the co-integration framework. In addition, the chapter specified the various tests associated with the application of co-integration techniques and the specialized procedures employed to deal with special cases such as policy instability and structural change.

CHAPTER 5

STATISTICAL PROPERTIES OF VARIABLES AND STRUCTURAL BREAKS

5.1 Introduction

One of the most important questions to resolve in analyzing time series data is whether or not they are stationary. The theoretical basis for this requirement has been well covered in earlier chapters and need not be repeated. In this sub-section, the main focus will be on describing the procedures used to establish this important statistical property. The study used both the Microfit 4.1 interactive package for econometrics analysis and E-Views. On the basis of the justifications provided for the model structure in Chapter 4, a total of 10 variables were considered for the analysis. The procedures for determining the statistical properties of the variables are discussed in this section.

Another important statistical property that calls for explicit attention is the existence, or otherwise, of structural breaks. Breaks can occur in a time series data set for two reasons. One reason may be that there are outliers in the data set. These are extreme values that deviate substantially from the modal values in the set. This can happen because the data set is of appreciable length and has been obtained from multiple sources. That possibility exists in the present study. Another reason for breaks may be policy changes. When rapid policy developments characterize economy management in the environment under study, the strong possibility exists that coefficients of the estimated parameters will vary to a significant degree and exhibit features that make them appear to belong to different populations. As is well-known, South Africa has undergone far-reaching changes in recent times, particularly in the last decade. One sector that has seen a profusion of such changes is the agricultural sector, not least because of its history as has been elaborately reviewed in earlier chapters. So, it will be expected that data relating to the agricultural sector will exhibit characteristics typical of structural breaks.

In the light of the above, and following procedures already popularized by Alemu (2003) and Alemu, Oosthuizen and Van Schalkwyk (2004), a different approach to unit root testing is employed in this thesis. The methodologies have been dealt with in the literature review and involve carrying out a series of recursive analyses on the variables at levels. Ordinarily, the Perron test would estimate an equation of the type:

$$Y_t = \mu + \theta DU_t + \beta t + \gamma DT_t + dD(T_B)_t + \alpha y_{t-1} + \sum_{i=1}^{k} c_t \Delta y_{t-1} + e_t$$

where;

μ = the intercept term;
T_B = time of break
$D(T_B)$ = value of 1 if t = T_B + 1, and 0 otherwise;
DU_t = value of 1 if t > T_B , and otherwise
DT = t if t > T_B, and 0 otherwise.

But this approach would assume that the exact break date is known and that, for a policy-induced break, the effect of the policy is felt in the very same year that the policy is introduced. But, as is well-known, this is hardly the case. Particularly in agriculture where policies elicit varying responses from farmers and other participants in the agricultural market, and usually at different paces and timeframes, the effect of policy may take sometime to be observed in real life. In view of this reality, the approach adopted in this thesis is to carry out the recursive analysis on the coefficient of the individual variables of the model and inspect them to see what patterns the coefficients exhibit in relation to the bounding standard error bands. Where the coefficient is seen to have exhibited a clear change in trend, the corresponding year can be tentatively identified as a possible break year. This will then be subjected to a Chow test to determine whether or not the break is significant. If breaks can be confirmed by this procedure, then annual dummies associated with those years are defined and inserted in the model on which an OLS can be performed to determine the long-run relationship.

Given the foregoing, four procedures were applied as follows: first, an Ordinary Least Squares (OLS) estimation was carried out on the levels of the transformed data. Second, a recursive analysis was conducted on the coefficient of the variables (whether or not they showed significance in the OLS regression). The third procedure was to examine the pattern displayed by the coefficients in the recursive maps and identify dates that may be associated with possible breaks and follow up by conducting tests for structural breaks in the data series using the Chow Breakpoint Test. Finally, unit root tests will be conducted to confirm impressions already formed by earlier procedures.

5.2 Estimation of the Variables in Levels

The purpose of the OLS estimation of the variables is to ascertain how well the resulting model mirrors the system it is intended to model. This will provide insight into the nature of the data in terms of their stationarity or otherwise. This information can be gleaned from whether or not the coefficients of the estimated variables are significant. Even if the coefficients are significant, the coefficients can still exhibit non-constancy, a fact which will be examined further and explained when we carry out the recursive analysis.

Table 5.1 presents the results of the OLS regression in which farmland prices (RLPH) was set as the dependent variable and the rest of the variables were defined as the explanatory variables. Despite high R^2 and Adjusted-R^2, the low Durbin-Watson statistic (DW < 1.5) suggests problems of serial correlation or first-order autocorrelation in the equation. Quite clearly, the fitted model does not fully describe the pattern of relationship between the explanatory variables and the dependent variable.

The results in Table 5.1 may imply that deflating the prices and values to constant prices have not removed their inherent instability. Although a few variables (notably the real interest rate on debt, the real net farm income, and the real short-term capital inflows per hectare) showed high significance at 1%, it is reasonable to suspect that the variables are non-stationary and it will not be possible to reject the null of unit root in the data. But, as Perron (1989) suggests, the spurious results indicated above may result from other factors

inherent in the underlying series and these have to be identified before any definitive statements can be made about the statistical properties of the data series. One such problem is structural shocks which will result in the means of two different segments of the series being significantly different from each other. Such structural breaks in the data may lead to a failure to reject the null hypothesis of the existence of a unit root because the resulting stationary fluctuations caused by the break send the confusing signal of stationarity which conventional tests pick up (Perron, 1989). A recursive analysis of the coefficients of the above OLS regression is one way to attempt to identify these underlying causes of data instability and spuriousness in a regression analysis.

Table 5.1: Results of initial OLS regression on levels of variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1219.280	351.8777	-3.465066	0.0013
RINTRD	-6962.729	1520.845	-4.578199	0.0000
RNFI	1.265208	0.704984	1.794662	0.0805
RFDPH	-1.300477	0.641532	-2.027142	0.0495
RFBSPH	0.281396	0.056020	5.023142	0.0000
RGDPC	0.181950	0.025749	7.066210	0.0000
INFL	-7360.216	1921.726	-3.830003	0.0005
RFBLPH	-2.001993	0.992810	-2.016491	0.0507
RSAUS	0.017515	0.092147	0.190075	0.8502
LNDTR	-355.0894	168.3913	-2.108716	0.0414
R-squared	0.937733	Mean dependent var		1593.116
Adjusted R-squared	0.923363	S.D. dependent var		607.6413
S.E. of regression	168.2155	Akaike info criterion		13.26827
Durbin-Watson stat	1.376943	Prob(F-statistic)		0.000000

Another problem with this equation is that it also includes the land transfer variable, which span a shorter period than the rest of the data set. In this case, a dummy was used to indicate the absence of land transfers to the black population prior to 1994, and the differences in the rate of land transfers between the eras of SLAG and LRAD. For this reason, the land transfer variable had zero values for about 39 years and 1 and 2 from 1995 when land transfers are assumed to have begun. Putting this variable in the same model as the other variables means that a recursive analysis will be partial for the other variables. For this reason, a second equation is estimated without the land transfer

variable (see Table 5.2). The recursive analysis was then carried out on the basis of these results.

Table 5.2: Results of OLS regression on levels of variables (excluding land transfers)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1007.245	351.4330	-2.866108	0.0066
RINTRD	-9030.836	1211.419	-7.454760	0.0000
RNFI	1.306470	0.734446	1.778850	0.0829
RFDPH	-0.966639	0.647923	-1.491904	0.1436
RFBSPH	0.305247	0.057181	5.338224	0.0000
RGDPC	0.175975	0.026673	6.597538	0.0000
INFL	-8456.659	1928.107	-4.385990	0.0001
RFBLPH	-3.501150	0.722238	-4.847643	0.0000
RSAUS	-0.001572	0.095571	-0.016443	0.9870
R-squared	0.930633	Mean dependent var		1593.116
Adjusted R-squared	0.916760	S.D. dependent var		607.6413
S.E. of regression	175.3131	Akaike info criterion		13.33543
Durbin-Watson stat	1.278397	Prob(F-statistic)		0.000000

5.3 Recursive Analysis of Coefficients of Explanatory Variables

This analysis tests for the stability of the regression coefficients resulting from the OLS procedure. The purpose is to see how the associated variables are trending and whether their behaviour when plotted between two standard error bands can provide sufficient basis for concluding on the extent to which the data series is influenced by either permanent shocks or transitory components (Perron, 1990). The E-Views package provides a straightforward procedure for carrying out this analysis in a step-wise manner. The resulting graphs present patterns of the relevant regression coefficients that can then be examined for decision on the possible break dates in the data series. These results are discussed in the next sections.

5.3.1 Recursive Analysis of the Coefficient of Real Interest on Debt

The results of the recursive analysis of the coefficient of the interest rate on debt are shown in Figure 5.1. According to the results, the coefficient trended steeply upwards up to 1980 and then fell precipitously and stayed down for about five years up to 1985. It

then rose again but remained negative and relatively stable up to the end of the observation period. These results are clearly consistent with the observed trend in the economy today which has prompted the Governor of the Reserve Bank to repeatedly warn about the imminence of an increase in the interest rate to curb excessive consumption spending among the population.

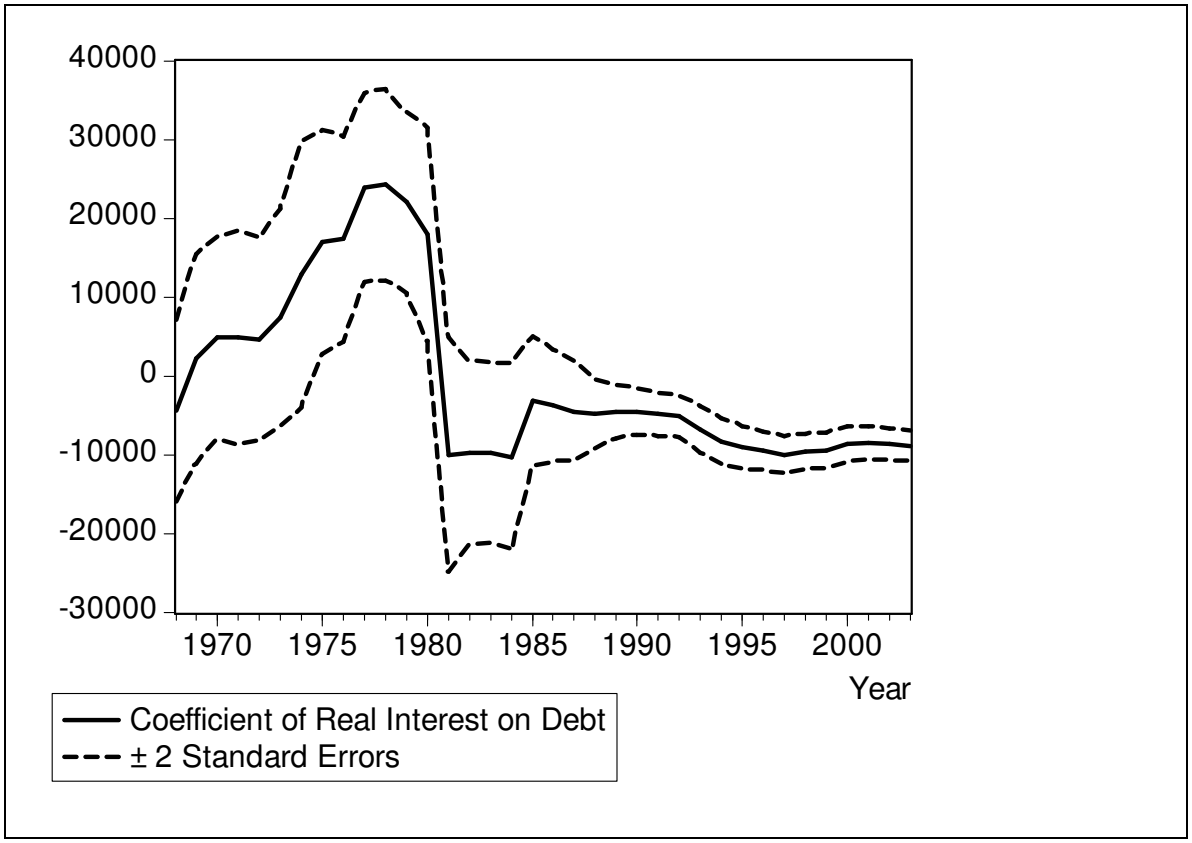

Figure 5.1: Recursive estimate of coefficient of Real Interest on Debt per Hectare

5.3.2 Recursive Analysis of the Coefficient of Real Net Farm Income

The coefficient of real net farm income presented a generally upward trend which could be divided into four distinct phases (Figure 5.2). The first phase lasted up to about 1977, and the second phase lasted up to 1985. Following that, a period of about 5 years ensued during which the coefficient declined, although quite slowly as the 1990s began. From the early 1990s the coefficient was climbing slowly initially and then rose quite sharply in about 1998/99 before it attained a peak in 2000 and then started to decline again. This

pattern seems to mirror the trend in net farm incomes in the country beyond the observation period. According to data generated by the Department of Agriculture (DoA, 2006), net farm income as at 30 June 2006 continued a three-year decline which has had negative consequences for farmers' cash flows in recent times.

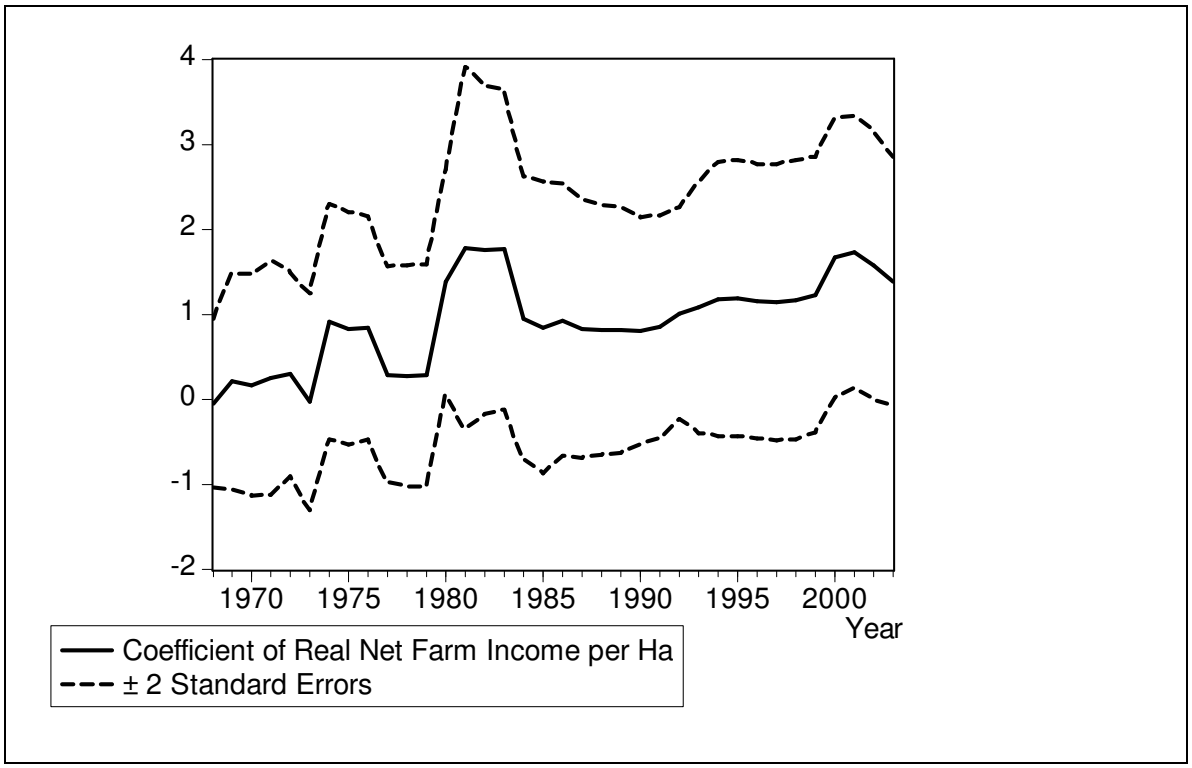

Figure 5.2: Recursive estimate of coefficient of real net farm income per ha

5.3.3 Recursive Analysis of Coefficient of Real Farm Debt per Hectare

The recursive analysis suggests that at least four phases can be distinguished in the trends of the farm debt per hectare. These results are presented in Figure 5.3. The first phase probably ended about the mid-1970s when a downward trend in the coefficient of the variable came to an end. This period was followed by about 10 years of relative stability in the coefficient, up to the early 1980s. Subsequently, the coefficient began falling again, perhaps for 5 years up to 1985, almost nearing zero. From 1985 to the end of the observation period, there was again another period of relative stability in the data. Thus, with respect to the farm debt per hectare, it can be assumed that possible break dates are 1955-1970, 1970 – 1980, 1980 – 1985, 1985 – 2003. In terms of how these dates relate to

what is known about policy developments in South African agricultural sector, it needs to be borne in mind that the 1974-1976 period was the period when support to agriculture by the former government was at its highest. Such support obviously included concessional lending to farmers who were encouraged by favourable loan terms to accumulate debts and invest in capital intensive operations to expand production in line with the government's food self-sufficiency policy at the time. Since the mid-1980s, real farm debt has been falling steadily, coinciding with the onset of gradual dismantling of the support structures. These points will be borne in mind in applying the Chow test, within restrictions imposed by the sizes of the sub-samples to be introduced in the test.

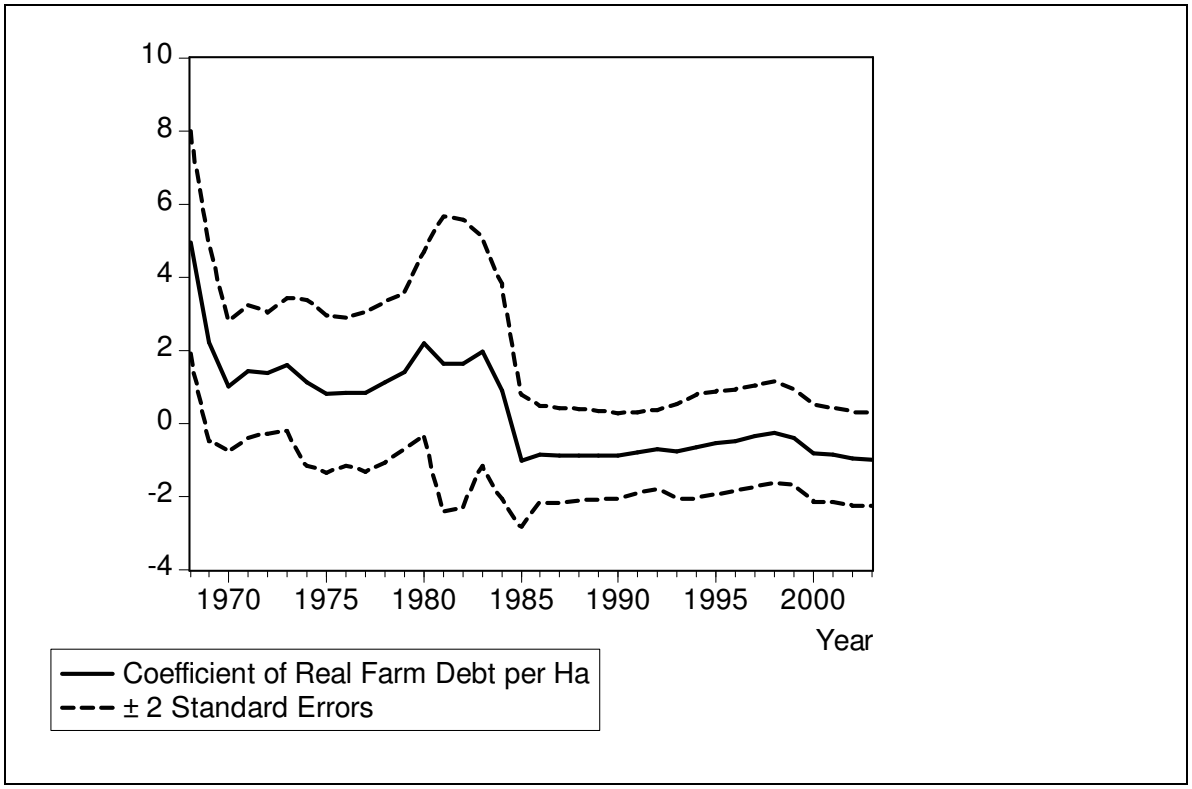

Figure 5.3: Recursive estimate of coefficient of farm debt per ha

5.3.4 Recursive Analysis of the Coefficient of Real Short-term Foreign Inflows

In the case of the real value of property-related spending of foreign buyers, the results of the recursive analysis are presented for the two measures reported by the South African Reserve Bank, namely short-term and long-term capital inflows from the private non-banking sector. In this section, the results are presented for the short-term foreign inflows

(see Figures 5.4). In terms of the relevant theory, the short-term inflows more closely approximate the foreign expenditures in property rather than equity investments. As Figure 5.4 shows, the coefficient of this variable exhibited considerable volatility up to the late 1980s. Over that period, the coefficient was also largely negative. Interestingly, the coefficient dipped quite sharply in the period following the imposition of economic sanctions on the Apartheid regime by the governments of the United States of America and Britain. Since the 1990s, the coefficient has been growing, albeit slowly and has remained positive. It is also useful to note that a kink in the upward trending curve occurred around 1999/2000. This result seems to be consistent with the attitude of the international community to political developments in South Africa. Up to the early 1990s, there was a huge amount of pessimism about the prospects of stability in the country and investor confidence must have been heavily influenced by such feelings. The situation definitely began to change subsequently, even before the broad-based democratic elections in 1994, and continued to improve over the 1990s. The perceptible evidence of some increase in foreign property spending, in real terms, is consistent with recent concerns at the policy circles about their role in the apparent escalation of property prices in the country in the last few years. These dates will be important for the subsequent tests to be conducted.

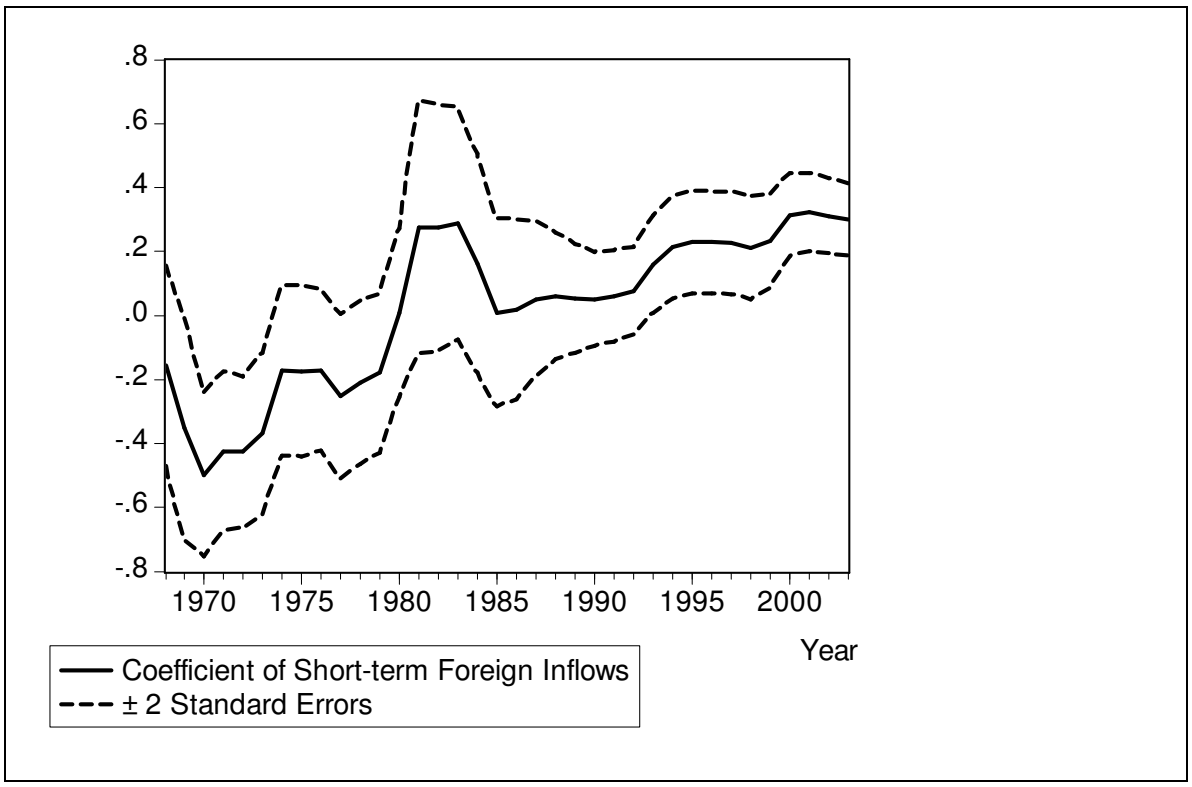

Figure 5.4: Recursive estimate of coefficient of short-term capital inflow per ha

5.3.5 Recursive Analysis of Long-term Foreign Inflows

In the case of long-term capital inflows, Figure 5.5 presents the results. There is evidence that the coefficient in this case exhibited a consistent unstable pattern. Where the data availability situation compels the use of a proxy as in this case, judgement on whether or not it is valid should be governed by, among other factors, how closely its behaviour mirrors reality. Figure 5.5 suggests that the coefficient of the variable was below zero from the 1990s. Such behaviour of the variable does not seem to be consistent with the current perceptions about foreign interests in South African property or what is intuitively known about how much foreign private interests have been growing in the country in recent years. This could confirm that it is indeed the short-term rather than long-term inflows that relate to property purchases.

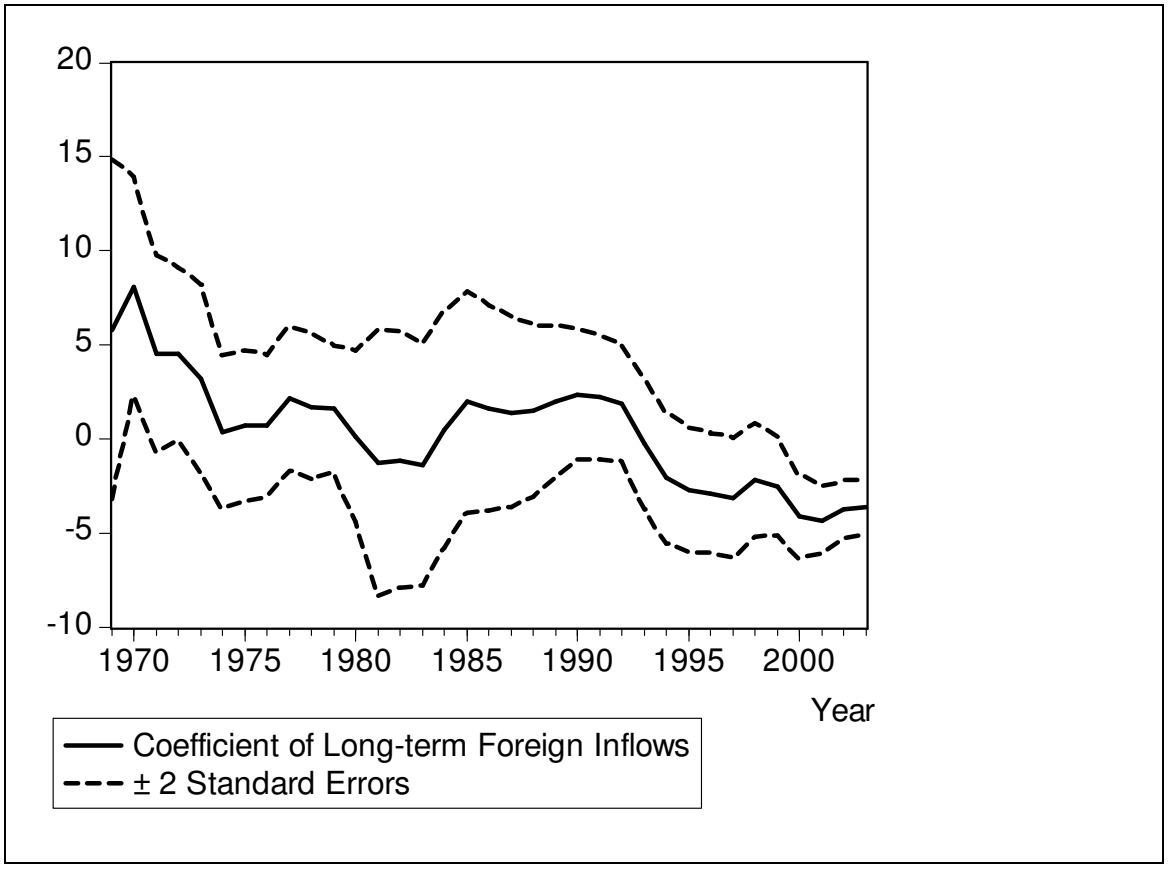

Figure 5.5: Recursive estimate of coefficient of long-term capital inflow per ha

5.3.6 Recursive Analysis Real GDP per Capita

Figure 5.6 presents the results of the recursive analysis performed on real GDP per capita. The results suggest that the coefficient trended upwards initially up to about 1970 and then turned downwards until the early 1980s when it began to rise to another peak in about 1985. From 1985 the coefficient maintained relative stability up to the end of the observation period. Thus, the definite turning points can be identified as 1970, 1980 and 1985. The picture emerging is that the GDP per capita was always positive even if subject to wide swings, especially during the Apartheid era. For instance, the coefficient was falling in the early 1980s probably to reflect declining GDP per capita during that period. Following this period, the coefficient rose but came to an abrupt halt in 1985 which coincides with the deepening of sanctions aimed at forcing the Apartheid regime to introduce reforms and release political prisoners. From that time, the coefficient did not

show any dramatic changes. On the basis of the observed pattern, it is possible to consider break dates as 1970, 1980, and 1985.

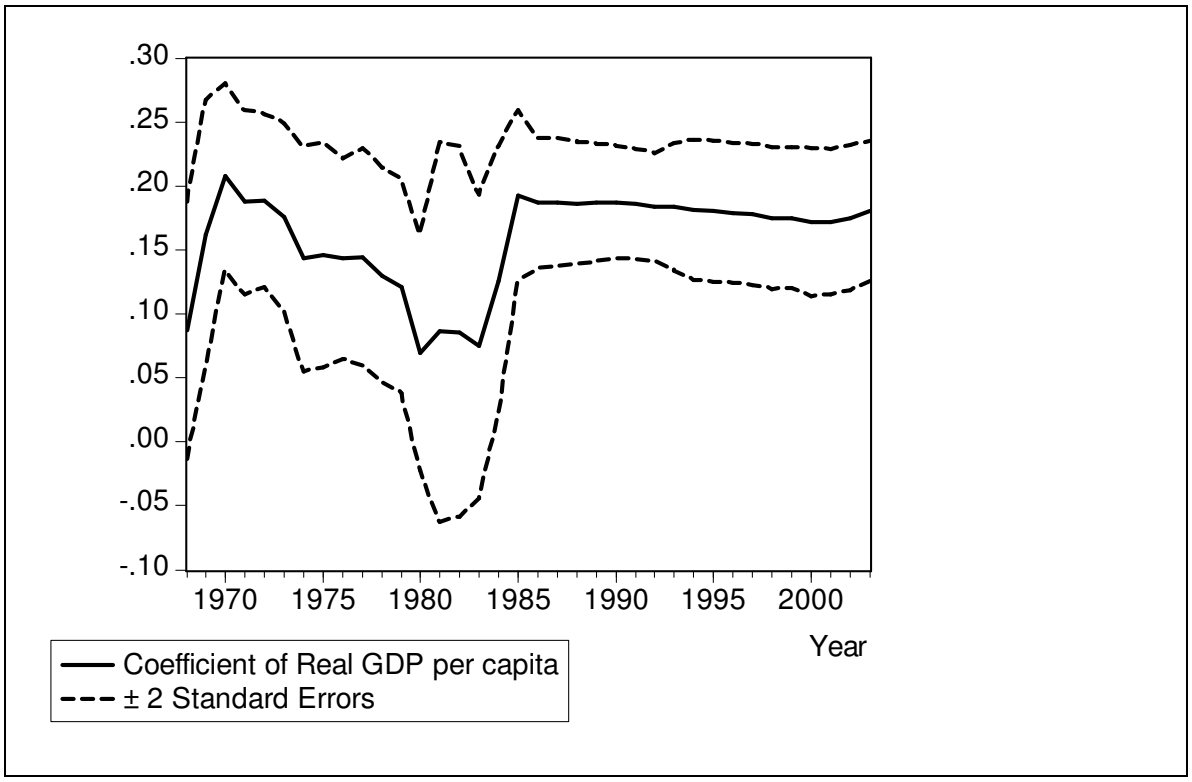

Figure 5.6: Recursive estimate of coefficient real GDP per capita

These dates can be related to policy developments in South Africa over the past 50 years. To compel the Apartheid regime to introduce political reforms and release long-serving political prisoners, the international community imposed economic sanctions which brought considerable distress on the economy. Over the late 1980s there seemed to be some recovery, possibly because of the initiation of talks geared towards achieving a negotiated settlement to the political crisis in the country. It is also possible that the substantial support provided to farmers from the mid-1970s accounted for the recovery of the sector and improvements in its contributions to the GDP. It is also possible that improved economic management in the face of growing sanctions may have accounted for the slight amelioration of the growth rate of GDP over the period. In any case, since the 1990s, GDP growth rates seemed to have improved significantly and remain quite securely in positive territories. However, due to sizeable declines over a good number of

years, the negative growth rates seemed to have been dominant, probably accounting for the coefficient being under zero most of the time.

5.3.7 Recursive Analysis of the Coefficient of Rate of Inflation

The results show that the rate of inflation has generally growing negatively or almost not at all. However, some noteworthy dates can be picked out as shown in Figure 5.7. For instance, the coefficient was clearly falling in the late 1960s, but swung upwards from about 1973, forming a series of troughs and peaks up to 1990 before it again began to slide upwards slowly, just managing to stay above zero towards the end of the observation period.

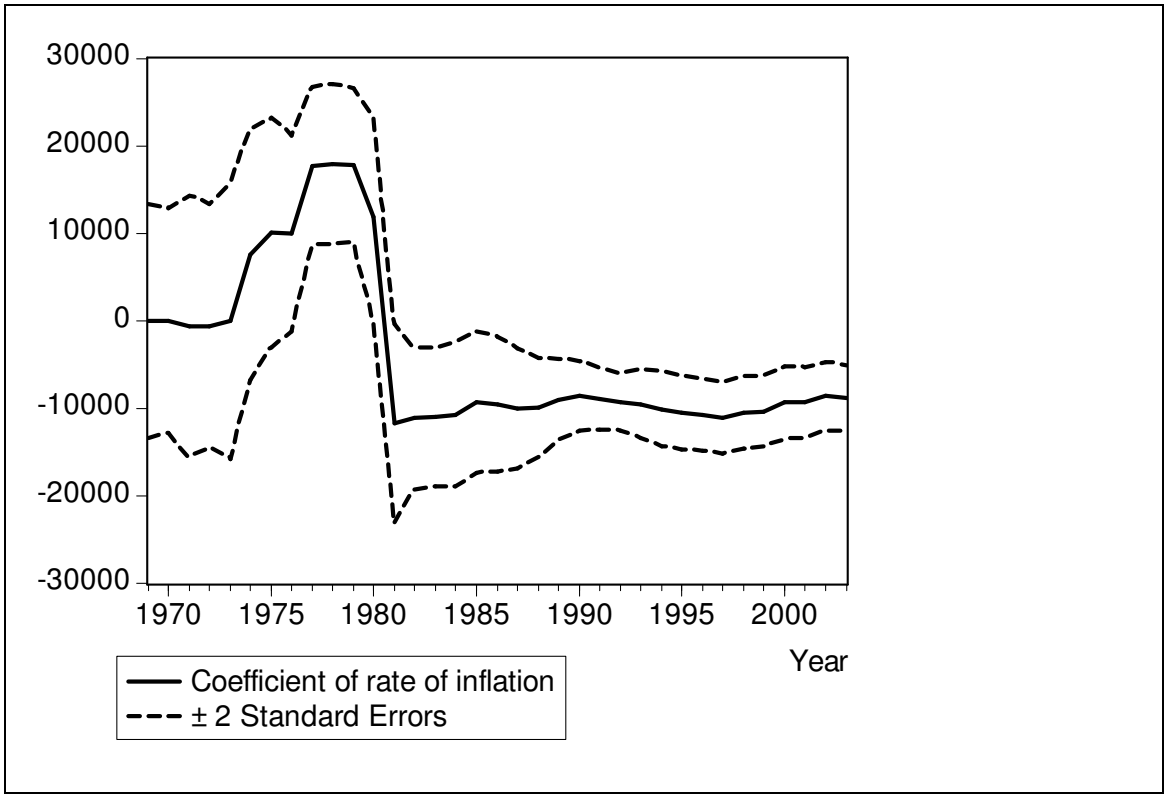

Figure 5.7: Recursive estimate of coefficient of rate of inflation

5.3.8 Recursive Analysis of the Real Exchange Rate

As indicated in Chapter 4, the model in this study is utilizing a data set for the period 1955-2003 for the exchange rate between the rand and the US dollar. The behaviour of the coefficient for the real exchange rate resulting from the OLS regression in which the variable was included is shown in Figure 5.8. The results suggest a relatively stable trend in the real exchange rate as indicated by its coefficient; following a period in the late 1970s and early 1980s when the rates seemed to have been in negative territory, they recovered over the rest of the observation period and fluctuated almost imperceptibly above zero. Since the real exchange rate interfaces between the national economy and the international environment, the relative stability of this measure is understandable as it reflects the moderate changes that usually characterize such macro-prices in the industrialized countries that are South Africa's major trading partners. There are three distinct periods when the behaviour of the coefficient suggest possible breaks in the underlying data, namely the early and mid-1980s, and about 2001.

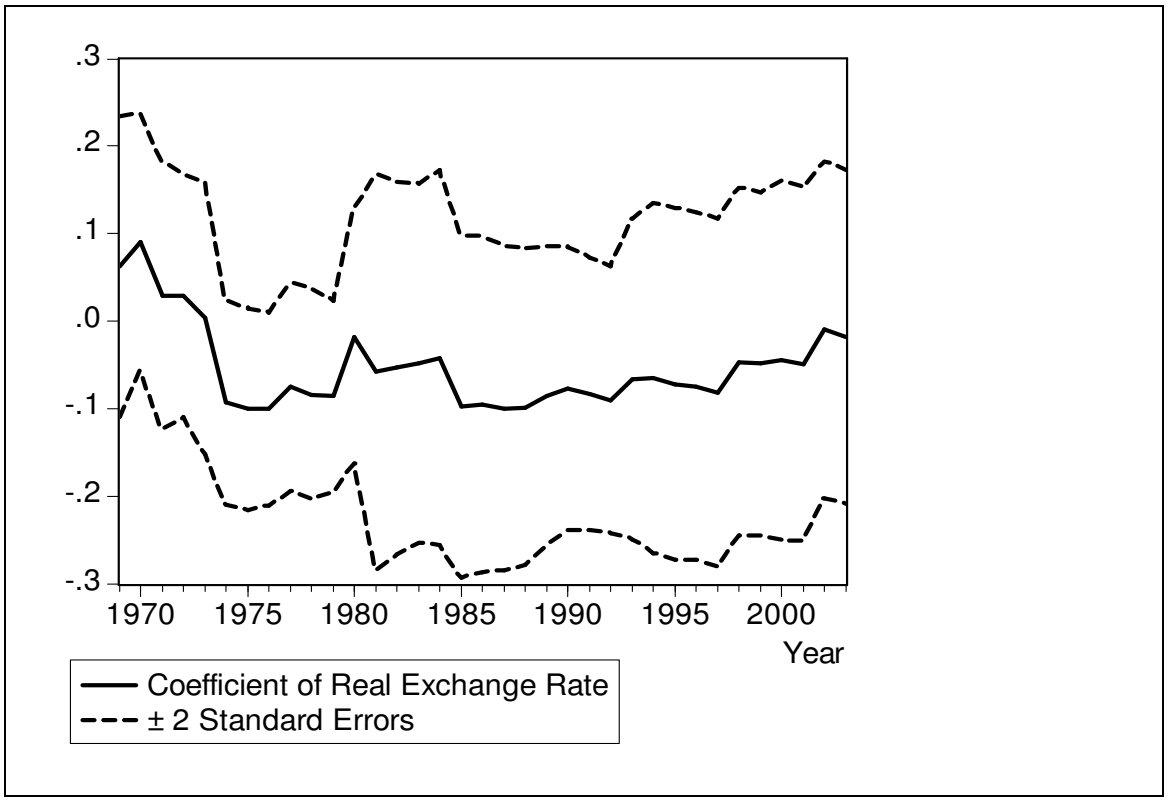

Figure 5.8: Recursive estimate of coefficient of real effective exchange rate

5.3.9 Recursive Analysis of Coefficient of Land Transfers

A dummy was used in this case to capture the phenomenon of land transfers to the black population following the return to democratic rule and the inception of the land reform programme beginning from about 1995. The behaviour of the coefficient of this variable is shown in Figure 5.9. Given that a binary dummy was used over a relatively short period, it is hardly possible that dramatic jumps may have occurred in the series. However, the sign of the coefficient of the modeled variable can very accurately be predicted by the pattern exhibited by the recursive analysis. As is clear from Figure 5.9, the coefficient remained negative throughout the observation period, with no year-to-year variation.

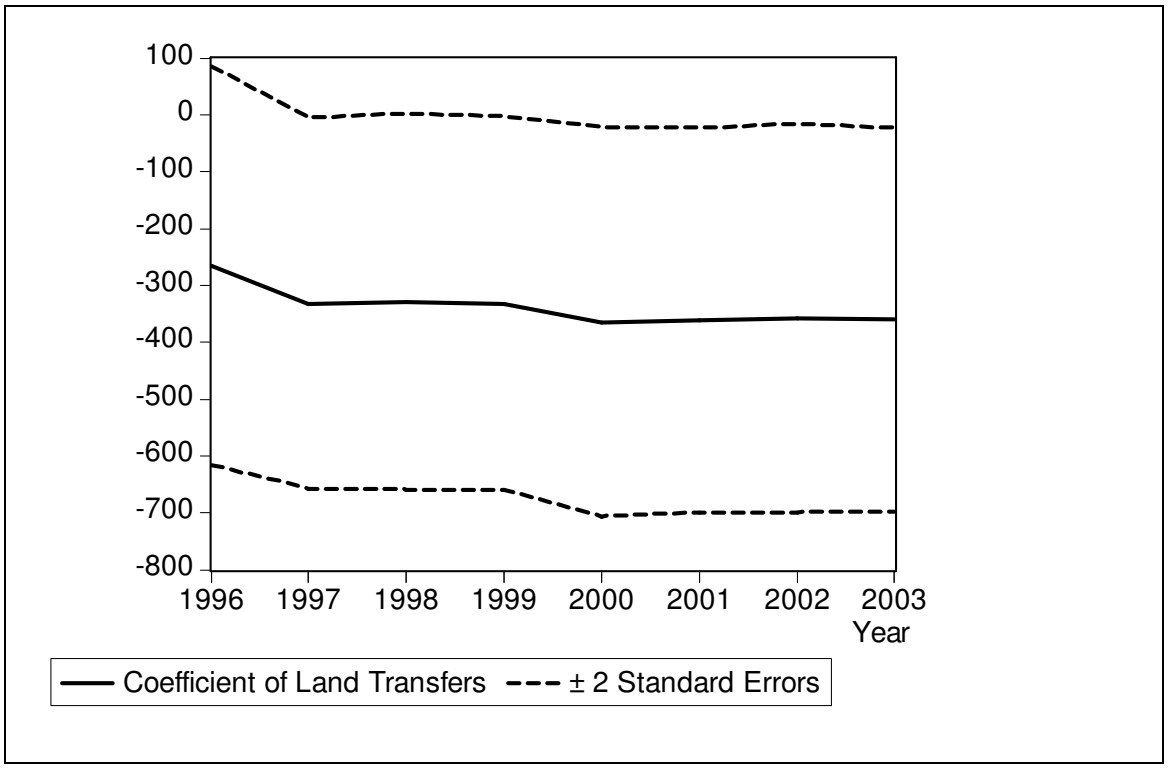

Figure 5.9: Recursive estimate of coefficient of land transfers

5.4 Testing for Structural Break in the Data

According to the theory, the results obtained by the regression will be different if the underlying data have been subject to structural change of one type or another. As

indicated in the literature review, it is often necessary to perform the test to identify the existence of a structural break prior to carrying out the unit root test since the existence of a structural break may lead to an erroneous conclusion of a unit root when in fact there is none (Perron, 1989). But a combined plot of the entire series did not indicate the sort of generalized breaks that would justify prior testing for structural breaks. In such a situation, the approach adopted by Lloyd and Rayner (1990) would be appropriate. In that case, the authors performed a recursive estimation of an equation previously estimated by OLS to see if there are significant differences in the regression coefficients for different sub-samples of the series. In that case, there was prior knowledge about the dates of the possible breaks and the authors examined the response of land prices to inflation before and after the break dates (Lloyd and Rayner, 1990).

A similar approach is being followed in the present study. The assumption of prior knowledge of break dates is made in this case as well based on the indications obtained from the recursive analyses of the coefficients of the explanatory variables. The most significant event in the economic history of South Africa is probably associated with the democratization process which took place in 1994 with the demise of the Apartheid rule and the enthronement of multiparty rule in which the majority black population assumed political power. But it is also true, as has been determined through the review in Chapter 2, that a number of important changes were already taking place in South Africa even before the 1990s as it became clear to the Apartheid government that the pattern and level of support to white commercial farmers was not sustainable. According to Van Schalkwyk (1995), deregulation and liberalization of the agricultural market of South Africa started in the mid-1980s.

One criticism of the test of structural breaks that assumes a known break point is that the effect of a policy may not necessarily manifest in the year of introduction of the policy. So, inserting the precise year of the policy in the model would not pick up the variation in the data that would confirm a structural break. It is argued that the effect of any policy takes sometime to work itself through the economy and the interval between the introduction of the policy and when its effect becomes manifest would normally vary

according to the nature of the policy. In this study, it is assumed that it took about 4 - 5 years for the effects of the deregulation and liberalization policies which started in the middle 1980s to be felt. This suggests that actual effects of the policies introduced in the late 1980s may have become manifest from 1990. In addition to those changes that came in the 1980s, there were also some policy reforms in the late 1960s, particularly the Agricultural Marketing Act of 1968 which established a total of 23 marketing schemes that had far-reaching impacts on the agricultural marketing system and influenced commodity and food prices to a considerable extent. Taking these known dates into account and the fact that sub-samples introduced into the stability tests must have observations that are equal to or more than the number of estimated parameters, a series of Chow tests were carried out with dates from the late 1960s up to the mid-1990s.

Table 5.3 presents the results of the Chow test on the data which divided the series into four sub-samples as follows: 1955 to 1969, 1970 to 1979, 1980 to 1991, and 1992 to 2003. The first period included, albeit marginally, the era of price support affecting commodity and food prices, the Agricultural Marketing Act having only been promulgated in 1968 as noted above. The second period represented an era of consolidation of agricultural support in favour of a food self-sufficiency programme. This was obviously the period when the Agricultural Marketing Act of 1968 was fully operational. In the third period, the unsustainability of the earlier policies had been realized and far-reaching efforts were put in place to deregulate the agricultural market and liberalize the system. The fourth period commencing in 1992 represented the era of democratization, complete deregulation, liberalization and agricultural restructuring, including the land reform programme and other aspects of agrarian reform. Although democratic elections were held only in 1994, it must be borne in mind that as soon as Mr. Nelson Mandela (former State President of South Africa) was released from prison in early 1990 and the constitutional talks began, every indication was that a regime change was inevitable. It would seem that strategies put in place under the new dispensation that came into force in 1994 were actually not different from what prevailed from the early 1990s as Eicher and Rukuni (1996) had observed. For instance, the in-coming government was a government of national unity which had the ruling party under the

Apartheid era as a partner. In fact, the Minister for Agriculture was a member of the old ruling party (Eicher and Rukuni, 1996). The results in Table 5.3 indicate that these events actually had a significant impact on the data and it is possible to reject the null hypothesis that there is no structural break in the data and accept the alternative that there indeed were multiple breaks.

Table 5.3: Chow breakpoint test assuming multiple breakpoint

Chow Breakpoint Test: 1970, 1980, 1992			
F-statistic	14.80877	Probability	0.000000
Log likelihood ratio	151.2524	Probability	0.000000

Table 5.4 tests the hypothesis that the current era of full deregulation and liberalization did not influence the values of the relevant coefficients of the estimated equation. The old regime that represented political repression in the country and featured far-reaching support to an agricultural sector completely dominated by white commercial farmers was replaced in 1994. But this era had actually started, for all practical purposes, before 1994. The Chow Breakpoint Test was applied on the data for all the years beween 1962 and 1997 to detect a single year that could be considered the major turning point in terms of policy effects. The results in Table 5.4 refer to a single breakpoint in 1985.

The results show that it is possible to reject the null hypothesis and accept the alternate that the era of full deregulation and liberalization has had some influence on the parameters estimated. It is also clear from the results that agricultural restructuring had actually commenced long before the exit of the Apartheid regime. Importantly, the results give some support to the perception that very little has changed in the agricultural sector since the ANC assumed control of the government. It was also in 1985 that both the United States of America and Great Britain “imposed selective economic sanctions on South Africa in protest of its racial policy” (Mujkanovic, 2005). It is possible that the sanctions, as well as the reaction to them, may have had important effects on the data.

Table 5.4: Chow breakpoint test assuming a single breakpoint

Chow Breakpoint Test: 1985			
F-statistic	12.03194	Probability	0.000000
Log likelihood ratio	66.89891	Probability	0.000000

Given the significant breakpoints tests for several periods ranging from 1970, it would be necessary to augument the model by the inclusion of dummies to account for those break dates. At this point, it is difficult to say which dates are associated with specific impacts and an iterative process would be followed to deal with this question in estimating the long-run equation as well as the error correction model.

5.5 Unit Root Tests

The Unit Root tests were conducted on the 10 variables. In general, the process begins with an examination of the behaviour of the variables when a regression is performed on their levels using the Ordinary Least Squares (OLS) technique. These results have been presented in the previous sections before the recursive analyses. Plotting the actual values of the variables against time shows how the variables are trending. Then the coefficients of the variables from the regression could be analyzed using the recursive procedure and the pattern examined to detect any possible breaks in the series that can be attributed to structural changes. Finally, the Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and/or Perron-Phillip tests are applied to the data to either support or refute indications provided by the foregoing procedures. The procedures used in the present study and the results are discussed below.

The results are shown in Table 5.5 for the conventional Dickey-Fuller (DF) and Augmented-Dickey-Fuller (ADF) tests. According to the results, the test statistics over the entire range were less than the critical values for the ADF at 95%. This confirms that the variables are non-stationary as predicted by economic theory. It is therefore possible to accept the null hypothesis of non-stationarity of the farmland price data. As is well-known, the non-stationary data series are poor candidates for reliable regression

procedures since they yield spurious results that are useless for predictive purposes. For this reason, economic theory requires that they be subjected to differencing or detrending procedures to make them stationary.

Table 5.5: Statistical Properties of variables and results of unit root tests

Variables	Type	Deterministic Components			Test		Coefficient	DW	Critical Values		
		Trend & Constant	Constant	None	DF	ADF			1%	5%	10%
RLPH	2nd diff			√		√	-3.92	2.07	-2.61	-1.95	-1.62
RINTRD	1st diff			√		√	-6.02	1.93	-2.61	-1.95	-1.62
RNFI	1st diff			√		√	-8.52	1.92	-2.61	-1.95	-1.62
RFDPH	2nd diff			√		√	-3.96	2.0	-2.61	-1.95	-1.62
RFBSPH	1st diff			√		√	-6.30	1.99	-2.61	-1.95	-1.62
RGDPC	2nd diff			√			-4.29	1.95	-2.61	-1.95	-1.62
INFL	2nd diff			√		√	-9.09	2.17	-2.61	-1.95	-1.62
RFBLPH	1st diff			√			-4.66	2.06	-2.61	-1.95	-1.62
RUSSA	1st diff			√			-5.28	1.72	-2.61	-1.95	-1.62
RSAUS	1st diff			√		√	-6.73	1.96	-2.61	-1.95	-1.62
LNDTR	2nd diff			√		√	-11.62	2.33	-2.61	-1.95	-1.62

*, ** and *** stand for levels of significance at 1%, 5% and 10% respectively.

5.6 Chapter Summary

This chapter examined the statistical properties of the variables included in the model. The first step was to run an ordinary least squares (OLS) regression on the data in levels to determine the extent to which the estimates could predict the relationships being explored. It was found that, despite high regression coefficients, the regression suggested high serial correlation. This judgement was based on the very low Durbin-Watson (DW) statistics derived from the regression. In line with theory and practice, a recursive analysis was then performed on each of the variables to further detect patterns in the coefficients which could form a basis for judgement as to the possible break dates in the data. The coefficients were generally unstable and suggested substantial structural breaks in the data. The Chow stability tests on the data confirmed that they fell into four distinct sub-samples, namely 1955-1969, 1970-1979, 1980-1991, and 1992-2003. These periods coincided with important policy regimes in the country. It was also found that a single breakpoint in the data may have occurred in 1985. Although South Africa's economic and political history has featured several landmark events that can easily explain the differences between periods before and after 1985. A possible significant event is perhaps the imposition of limited sanctions on South Africa's Apartheid regime by the two major world powers, namely USA and Great Britain, to secure concessions from that regime to end minority rule and enthrone a more inclusive and participatory governance system.

In the light of the foregoing, the data were subjected to further tests to determine the extent of their stationarity and level of integration. On the basis of the unit root tests carried out on both E-Views and the Microfit packages, it was concluded that the variables are all non-stationary. This result is consistent with economic theory in respect to the statistical behaviour of time series economic data. It was found that all the variables needed to be differenced either once or twice in order to make them stationary**.**

CHAPTER 6
ESTIMATION OF THE FARMLAND TRENDS MODEL

6.1 Introduction

In this chapter, the objective is to present the results of estimation of the model specified in the previous chapter. The derivation of the data and the transformations performed on them have already been described in the foregoing chapters. Following those procedures to standardize the data, the study employed the residual-based approach to cointegration analysis to determine the long-run relationships between farmland prices and a range of variables and subsequently fit an error correction model to determine the short-term dynamics of the relationships among these variables. A tentative forecast is attempted and reported subsequently, taking full cognizance of the limited data range available at this time. The steps for all the procedures undertaken are described in the next sections.

6.2 Tests of Co-integration

After the foregoing tests to establish the order of integration of the eight variables being considered for the present model, the next step is to find out whether or not there is co-integration. This is the process of determining the presence of any cointegrating relationships among the variables in the model. This is particularly important as the the objective of this study imposes the obligation to confirm or refute a long-term relationship among the variables that can explain the observed variations in farmland prices in the country. The policy implications and practical significance of this information are obvious.

Two methods are commonly employed to investigate the existence of cointegrating relationships among a set of integrated variables. Among others, Pindyck and Rubinfeld (1991) and Maddala and Kim (1998) have provided succinct descriptions of the methods which are broadly labeled:

- Single Equation Methods or Residual-based Approach, and
- System Methods or Vector Autoregression Analysis (VAR).

In this study, the single equation or residual-based approach is used and the procedure will be described in order to demonstrate its applicability to the present study.

6.2.1 Single Equation Methods for Cointegration Analysis

This is the procedure developed by Engle and Granger (1987) and involves the use of OLS to regress the residuals resulting from the prior regression of the variables at levels. It is therefore called the "residual-based" approach. The OLS regression provides a consistent estimator of the cointegrating parameter and it is then possible to test the residuals of the regression to decide whether or not the variables are cointegrated. According to Pindyck and Rubinfeld (1991), sometimes, the relationship we want to establish is between vectors of variables rather than the actual variables themselves. In that case, even the cointegrating parameter is also a vector of parameters and referred to as a cointegrating vector. The procedure remains the same, however. If we take the example of the relationship in equation (4.32) and assume that the variables, Y_t and X_t, or their vectors, are integrated of say order *d*, that is, they are *d*th-order homogeneous nonstationary, and W_t is *b*th-order homogeneous nonstationary, for $b<d$, then we conclude that Y_t and X_t ,are co-integrated of order *d,b*. The co-integrating regression that is run with OLS will look as follows:

$$y_t = \alpha + \beta x_t + \varepsilon_t \text{ ----------} (6.1)$$

where ε_t is the residual. The test is then to find out if the residuals from the regression are stationary. If the tests show that the residuals are stationary, it means that the variables Y_t and X_t, are cointegrated. The procedure is to test the null hypothesis that there is no cointegration. Rejecting the null hypothesis, and thus accepting the alternate hypothesis is tantamount to a confirmation that there is cointegration among the variables of interest. But the point is made that the residual-based approach can be inefficient and lead to contradictory results especially when the analysis involves more than a bivariate case, that is, more than two variables (Pesaran and Pesaran, 1997).

On a step-by-step basis, it is standard to proceed as follows:

- On the levels of the variables, run an OLS of the dependent variable, farmland prices, on the explanatory variables, including an intercept term whose presence is necessary to avoid negative regression coefficient, R^2. The procedure estimates the long-run equation that defines the linear relationship between the dependent variable and the independent variables.
- Save the residuals resulting from the above regression.
- Apply unit roots test on the residuals.
- If the residuals are found to be stationary, then conclude that there is cointegration.
- Then proceed to error correction mechanism.

6.2.2 OLS Regression on Levels of Variables

The results of the OLS regression of the variables in levels are presented in Table 6.1. These results are examined against the background of those obtained by the earlier regression reported in Chapter 5 where policy effects were not taken into account and questions of the inherent non-stationarity of the data and serial correlation were not addressed. In the present regression, nine annual dummies representing possible policy effects associated with the corresponding years from 1970 to 2002, were included.

One basis for decision on the annual dummies to include in the model was the patterns of the fitted and actual values of the dependent variables. When successive estimations showed high volatility of the residual term, suggesting the possible presence of outliers or breaks in the series which could cause substantial non-stationarity, the process is repeated with a new set of dummies until a stable residual plot was obtained. A stable residual plot would be one that does not exhibit any consistent trend. In a recent study involving time series data based on 36 annual observations, Vernon (1999) introduced 35 annual dummies in order "to cope with the non-stationarity of the data". The model was re-run several times with alternative dummies until they became significant. The results of the estimation are presented in Tables 6.1.

Table 6.1: Results of long-run estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-906.7590	160.5036	-5.649464	0.0000
RINTRD	1139.356	1019.809	1.117225	0.2720
RNFI	0.848837	0.374384	2.267288	0.0300
RFDPH	2.479399	0.417433	5.939636	0.0000
RFBSPH	0.053343	0.033737	1.581146	0.1234
RGDPC	0.104544	0.015229	6.865007	0.0000
INFL	524.5707	1183.241	0.443334	0.6604
RFBLPH	-2.279741	0.575686	-3.960044	0.0004
RSAUS	-0.083137	0.045386	-1.831798	0.0760
LNDTR	-131.3859	74.45592	-1.764613	0.0869
DUMMY75	153.4146	60.50217	2.535688	0.0161
DUMMY80	-431.6253	92.06529	-4.688252	0.0000
DUMMY81	-507.2414	95.99800	-5.283875	0.0000
DUMMY84	-479.3691	72.92600	-6.573363	0.0000
DUMMY01	402.9717	103.4753	3.894376	0.0005
DUMMY02	310.9375	92.29779	3.368851	0.0019
R-squared	0.990623	Mean dependent var		1593.116
Adjusted R-squared	0.986361	S.D. dependent var		607.6413
S.E. of regression	70.96395	Akaike info criterion		11.61997
Sum squared resid	166184.1	Schwarz criterion		12.23771
Log likelihood	-268.6893	F-statistic		232.4222
Durbin-Watson stat	2.021303	Prob(F-statistic)		0.000000

According to the results (see Table 6.1), both R^2 and adjusted-R^2 show quite significant outcomes at 99% and 98%, respectively. The Durbin-Watson (DW) statistic obtained from this procedure was 2.02 which is at the optimum level of 2 (E-Views, 1997). The functional form of the equation is therefore expected to be near optimal on the basis of the results. The White Heteroscedasticity test also shows a reasonable level of significance which means that any variance of the residual term cannot be a cause for concern. A comparison of the actual and fitted values of the dependent variable with the residual term is presented in Figure 6.1 and shows a close prediction of the farmland prices. The pattern of the residual term around the two standard error bands also indicates that the insertion of the annual dummies has stabilized the dependent variable series to a large extent and eliminated much of the trend in the series. Furthermore, both the skewedness and kurtosis of the residuals suggest a fairly normal curve (see Figure 6.2). Model fit was also ascertained by inspecting the trends in two model selection criteria, namely the Akaike Information

Criteria (AIC) and the Schwarz Bayesian Criterion (SB). In both cases, minimization of the measure with successive estimations was indicative of model adequacy when AIC was 11.61 and SB was 12.24.

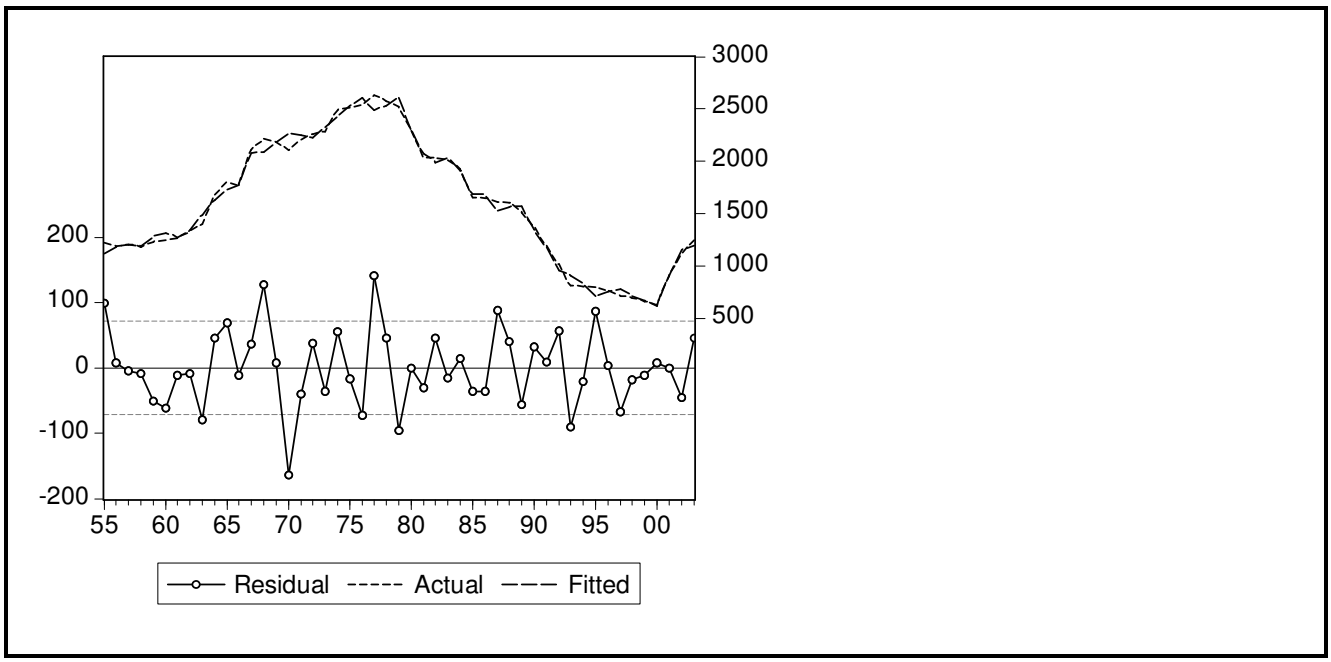

Figure 6.1: Comparison of actual and fitted values of the dependent variable and plot of the residual term.

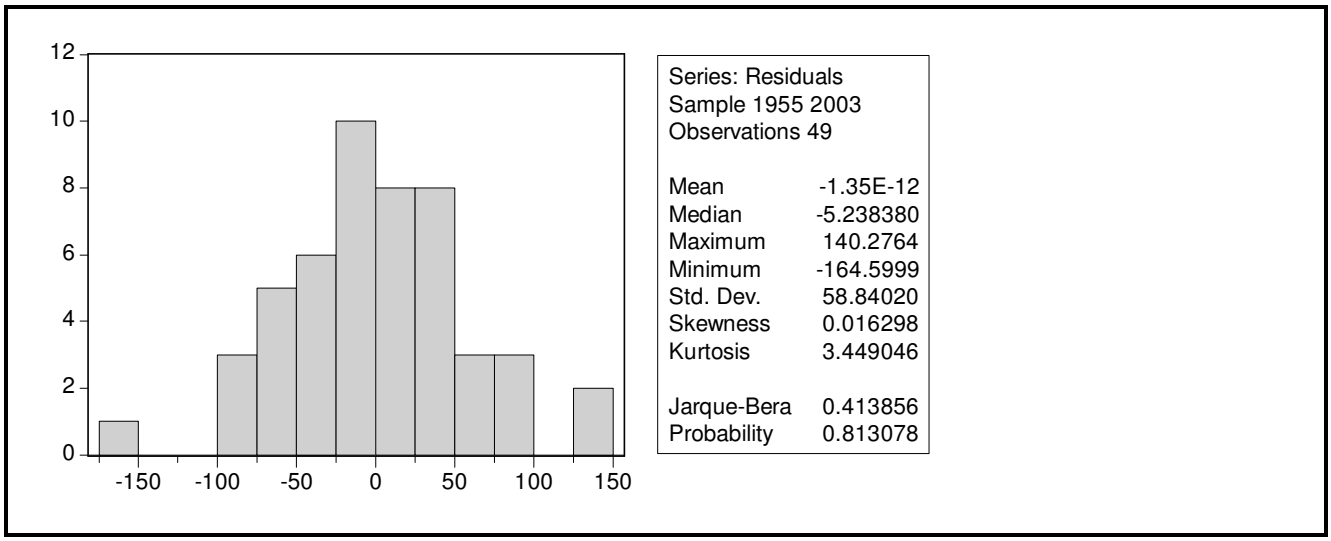

Figure 6.2: Test of the normality of the distribution of the residual terms of the dependent variable

The results indicated above would be examined side by side with the indications provided by the estimates presented in Chapter 5 in the absence of the annual dummies. On the basis of estimates in the absence of annual dummies (Table 5.1), it was found that real interest rate on debt, real farm debt per hectare, rate of inflation, long-term foreign capital inflows, and the dummy for land transfers, had a negative relationship with real farmland prices per hectare. On the other hand, positive relationships were observed between real farmland prices and real net farm income, real short-term capital inflows from foreigners, the real exchange rate, and real GDP per capital. In all but one case, namely the foreign exchange value of the local currency, all the relationships were statistically significant. However, with DW at a low 1.38 and strong evidence of serial correlation and partial autocorrelation, this equation cannot be accepted, strengthening the case for the insertion of the annual dummies as already indicated above.

The results presented in Table 6.1 suggest different patterns of relationships which could relate as much to the nature of the variables as to policy effects manifested by the presence of the annual dummies. For instance, the results suggest that real interest on debt and real farm debt which had a negative relationship in the previous estimate, consistent with economic theory, turned out to relate positively with real farmland prices in the presence of the annual dummies. However, this positive relationship was shown not to be statistically significant. Again, inflation rate which had previously shown a negative relationship with real farmland prices, became positively related with real farmland prices when annual dummies were introduced. While short-term foreign capital inflows remained positively related with real farmland prices under both scenarios, the relationship was no longer statistically significant when policy effects were taken into account. This contrasts sharply with the very high level of statistical significance observed earlier. On the other hand, the statistically significant negative relationship between real farmland prices and long-term foreign capital inflows persisted with or without policy effects. Again, in both scenarios, the real GDP per capita maintained a strong positive relationship with real farmland prices as would be expected. Given the observations in the foregoing, it is necessary to examine the results more closely and relate them to previous research and some theoretical notions based on the review of literature carried out earlier in this study.

6.2.2.1 Real Interest Rate on Debt per Hectare (rintrd)

Without a doubt, this is one of the most important variables from the point of view of long-term investment decisions in respect to land acquisition, and indeed any property. This is the cost of capital and determines how much debt a farmer can accumulate in line with expectations about profitability. Theoretically, the lower the rate of interest on debt, the more debt can be accumulated because borrowers may perceive that the cost of acquiring external finance for farm operations is affordable. But this does not necessarily have to happen unless there is an income or credit constraint because low interest rates can also result in reduced propensity to save out of current income. Both effects are important for the present analysis because liquidity is affected in either case. Thus, the lower the interest rate the higher the farmland prices either because debt levels have increased or because saving rates have fallen, both resulting in higher liquidity which tends to be inflationary on asset prices in general. As the effect of interest rate is exerted indirectly through effective demand, higher farmland prices do not necessarily have to result from a lowering of interest rates since a host of other factors can influence demand for farmland. The trends in interest rates have been discussed earlier in describing the variables and as part of the literature review. Similarly there has been extensive discussion on the position of the South African Reserve Bank that the rates have been too low for too long and need to be raised to curb excessive borrowing which is negatively impacting on several other macro-aggregates, including the rate of savings.

In any case, results obtained under the alternative policy effect assumptions have been briefly presented above to show that while in the absence of policy effect, a highly significant negative and theoretically consistent relationship is observed (Table 5.1), a positive, non-significant relationship is observed under the assumption that policy effect is present (Table 6.1). Figure 6.3 further illustrates this relationship very clearly and confirms the generally inconsistent pattern of relationship between real farmland prices and the real rate of interest on debt. While a positive relationship seemed to have prevailed in the early periods, in the 1950s and 1960s, the graph shows that over much of the 1970s and 1980s, there were periods when both variables moved in opposite directions over appreciable lengths of time, suggesting a negative relationship in line with economic

theory. During the 1980s, the real interest rate was mostly negative, so that small increases in the rates that hardly took them above zero may have had little or no impact on the real farmland prices. In the 1990s, especially in the post-election era, a clear negative relationship existed between the two variables, but this seemed to have disappeared in the last two years of the observation period when a positive relationship resumed. The graph (Figure 6.3) shows that in the last two to three years of the observation period when the farmland prices were going up, real rate of interest was also rising in contradiction of what economic theory would have predicted.

There are some explanations that can be proferred for this situation, the most obvious one being that policy effects may have been too strong to overshadow the theoretical effects of real interest rate. For instance, whereas declining interest rate would be consistent with a freeing of the constraints on credit availability which would raise the level of liquidity and hence cause prices to rise under the influence of an enhanced ability to pay within the economy, the indication is that this was not the case most of the time. It would seem that rising real interest rates when these are already extremely low would not create a credit constraint and therefore would have no effect on liquidity. The expectation is therefore that interest rates would have to rise sufficiently in order to have the desired effect as an instrument for regulating consumption and patterns of investment within the economy. The recent actions by the Reserve Bank to raise interest rates probably recognize this problem and it is likely that, in time, a closer link can be forged between these two variables. For the study period, the fact that the relationship is statistically non-significant means that it cannot be concluded that the present findings violate economic theory.

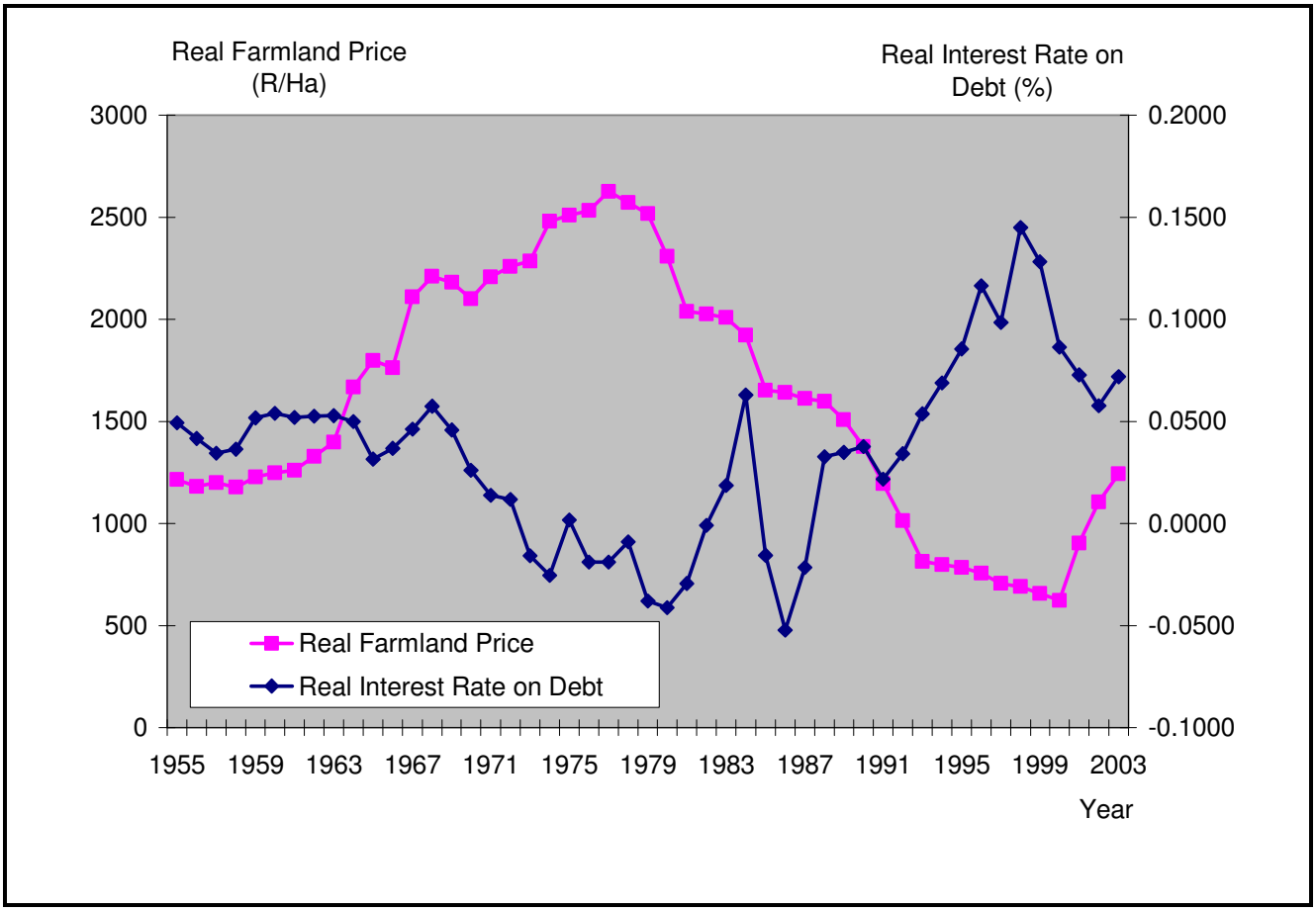

Figure 6.3: Real farmland prices and real interest rate on debt (1955-2003)

6.2.2.2 Real Net Farm Income Per Hectare (rnfi)

Figure 6.4 provides evidence of the pattern of relationships between real farmland prices and real net farm income over the years. From the graph, real net farm income has obviously been quite erratic over the years. Up to about 1970, the real net farm income generally trended upwards and seemed to move in step with real farmland prices. Subsequently, the two variables seemed to have changed course, trending generally downwards, with real net farm income continuing to exhibit considerable volatility. From the early 1980s up to about 1991, the two variables seemed to move apart somewhat, with real net farm income rising while real farmland prices continued to decline. Subsequently, the two variables have tended to move in step again. While its erratic pattern seems to have been moderated somewhat, there is a discernible downward trend in the real net farm

income in the last three years, consistent with recent reports by the Department of Agriculture (DoA, 2006).

Figure 6.4 suggests that real net farm income may have attained a peak in the mid-1970s when support to agriculture by the Apartheid regime was very high. At that time, the white commercial farmers who were the exclusive targets of government farm support programmes, were receiving credit at below market rates and had access to a wide variety of infrastructure and institutional support. All these would definitely have fuelled a favourable agricultural performance which led to higher demand for land to expand operations and continue to reap the largesse on offer. The long-term decline following this period of excessive government support seemed to have been triggered by the dismantling of the support structures from the 1980s as evidence of their unsustainability became glaring. According to Van Schalkwyk (1995), the dismantling of the government support structures actually began long before the change of government in 1994, and may actually have been initiated in the mid-1980s. The rather precipitous dipping of the real net farm income curve about mid-1980s seems to confirm the considerable impact this policy shift must have had on the farmers.

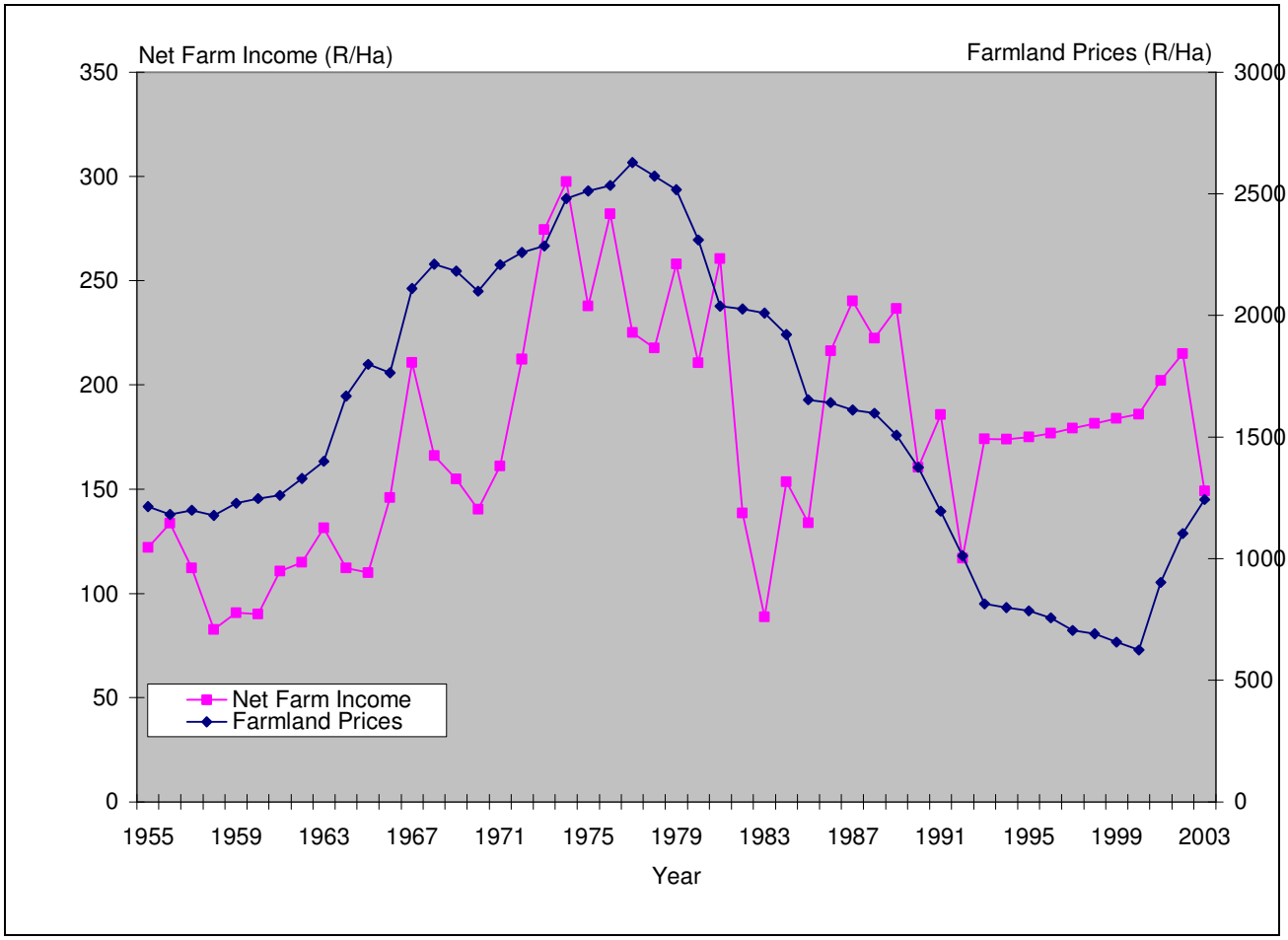

Figure 6.4: Real farmland prices and real net farm income (1955-2003)

Through this period of alternating ridges and troughs in the levels of the real net farm income curve, the real farmland price executed a generally smooth movement, going up and down with net farm income. Thus, the model prediction of a possible positive and significant relationship between the two variables, under alternative assumptions of policy intervention, is easily confirmed.

From 2000, however, it seems that the two variables began moving in opposite directions, suggesting a negative relationship. This situation is not surprising in view of the multiple other factors that have played a role in land price determination in South Africa in recent years, especially under the era of land reform and redistribution. Although not all agree, the fact that government has become a significant player in the market cannot be taken lightly. No matter the intention, once

government enters a market as a player (to buy or sell), things can no longer be the same and the *ceteris paribus* condition cannot be applied as the market ceases to be a competitive environment. In such a situation, it is unlikely that the prices that have prevailed during this period have been completely determined by the unfettered forces of demand and supply. At one level, government has influenced the supply situation quite markedly by purchasing land from white farmers for transfer to former black owners dispossessed under Apartheid. At another level, government has significantly influenced demand for land through the provison of cash grants to the black population which has affected their ability to buy. It is inconceivable that these forces could not have exerted considerable influence on the prices of farmland possibly in the upward direction. As is well-known, government decided in 1999 to speed up the pace of the land reform programme by introducing new mechanisms for land distribution, including the LRAD which came with an increased package of incentives than the SLAG which it replaced. Coincidentally, farmland prices began to move up quite steeply from 2000 (see Figure 6.4) despite declining real net farm incomes. Reasonable expectations that net farm incomes would eventually recover cannot be ruled out either.

Another factor that must also be taken into account is the process by which the farmland prices have been arrived at under the era of land reform. Since the government is providing the financing for the land transfers, government officials and consultants have been quite influencial in facilitating the process. The prospective buyers are assisted by private land consultants to prepare business plans which are then used for the purpose of applying for the grants from government. A complex process of matching buyers and sellers then ensues with government officials playing an important role to assist the two parties to arrive at a price that is accommodated by the size of the grant being awarded. Even if the allegation of some collusive practices cannot be substantiated in a situation where both buyer and seller stand to gain from the transaction, there is already scope for a high degree of manipulation in the process for the prices to have been solely determined by the forces of demand and supply. The fact that consultants are paid according to the size of the grant, and the farmland price agreed between buyer and seller is based on the size of the grant received, already creates serious distortion in the market and this needs to be taken into account. In any case, it is

necessary to investigate these further and see what role cash grants are playing specifically, with actual data when these are available for a reasonable length of time.

6.2.2.3 Real Farm Debt Per Hectare (rfdph)

The estimation suggests that a negative relationship exists between real farmland prices and real farm debt in the absence of policy effects (Table 5.1) whereas the relationship becomes positive when policy effects are considered (Table 6.1). This relationship is plotted and presented in Figure 6.5 which indicates that when farm debt is at low levels, real farmland prices is also low, and vice versa. Over the whole of the late 1950s and up to about 1980, the two variables seemed to move together, generally trending upwards, more so for land prices than for farm debt. From then on, both variables seemed to part ways but only for a short period during which time farm debt continued to rise while farmland prices started to decline. From about 1985, however, farm debt made a sudden about-turn and began to fall with real farmland prices, a situation which seemed to persist to the end of the observation period. Van Schalkwyk (1995) observed a similar pattern between real farm debt and real farmland prices which moved up together up to 1967 and then exhibited a random pattern over the next few years, intersected in about 1983 following which farmland prices began to fall sharply while farm debt rose initially before it began to fall from around 1987.

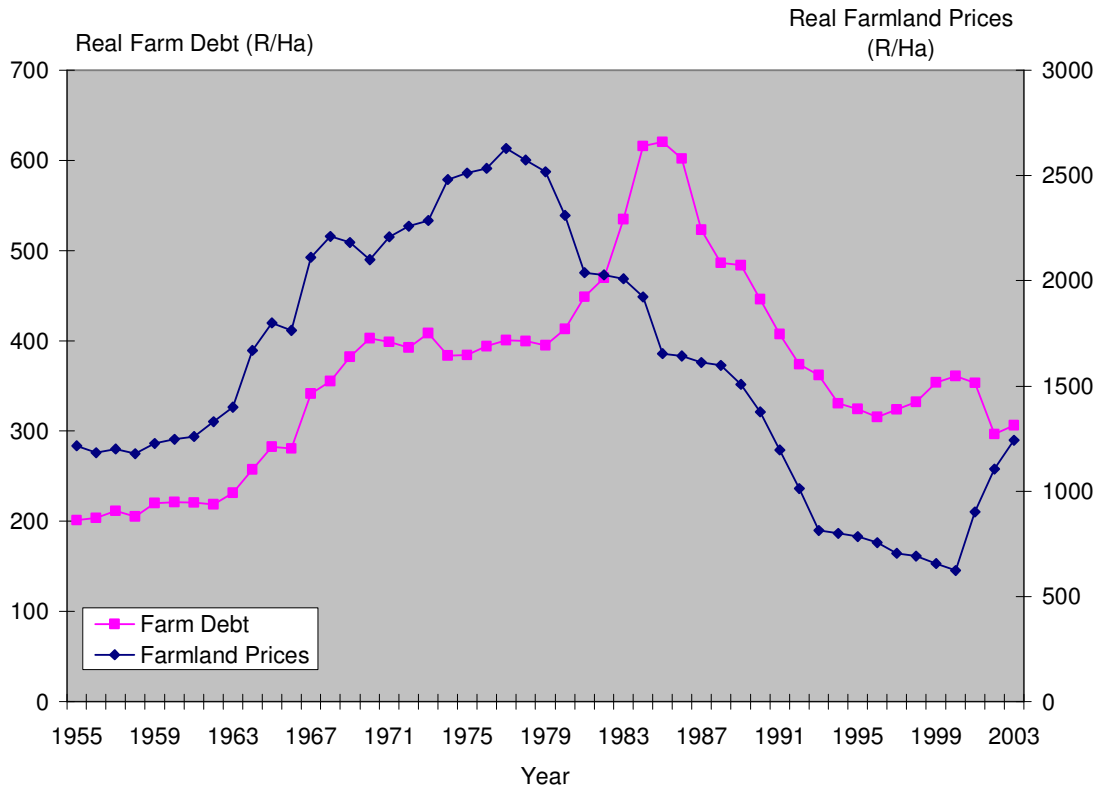

Figure 6.5: Real farmland prices and real farm debt (1955-2003)

According to the plotted values in the present study, real farm debt had been falling steadily over the years until about 2000 when it turned up again. There are indications that farm debts at current prices are again beginning to climb, with more recent data suggesting increases in excess of 11.8% in 2005 to a new level of R35.6 billion (Coetzee, 2005). These increases in farm debt probably reflect the record low levels of interest rates in the country for sometime now. At the same time, the sector is characterized by low productivity which makes it virtually impossible for farmers to generate sufficient capital of their own to invest in new enterprises or expand existing ones. According to the regression results, the model predicts a highly significant relationship between real farmland prices and real farm debt. While more debt could translate to more liquidity, it is also true that rising farm debt reflects increasing shortage of own capital which is easily augmented by borrowing where easy terms exist for accessing credit. Therefore, in and of itself, rising farm debt

should not automatically translate to higher farmland prices unless it also leads to an increase in effective demand for farmland. In the same way, declining levels of farm debt may lead to falling farmland prices if demand for farmland had not already been curtailed by diminishing liquidity. It is therefore understandable how a strong positive relationship can exist between the two variables as predicted by the model.

6.2.2.4 Real Foreign Capital Inflows Per Hectare (rfbsph & rfblph)

Elsewhere in this thesis, it has been observed that foreign buyers have recently become important players in the South African land market. This situation has generated a considerable amount of concern over their possible effect on the pricing of farmland in the country. The speculation is that foreign buyers who have the advantage of higher earnings in their home countries, predominantly the Western industrial democracies, can afford to pay more for land and are therefore pricing locals out of the market. Incidentally, the government equally holds this view and had actually set up a commission in 2004 to investigate the issue and advise on the way forward. However, a number of local analysts insist that the foreign buyers and local buyers of property do not operate in the same market. This school of thought maintains that the land market is not a homogenous entity selling one unique product, but is rather segmented, with a wide variety of products, each of which has a different category of clientele. For instance, it is averred that while foreign buyers go for the more exotic property such as game parks and nature reserves, local buyers are attracted to the more conventional agricultural property for conventional farming.

In the housing market, about which a lot has been written and said in recent times, the same situation prevails, with foreign buyers going for properties on beachfronts and golf estates to which they migrate to escape from the winter season of the Northern Hemisphere. On the other hand, South Africans are buying residential houses in the inner cities and occasionally the suburbs of large cities but generally of the conventional family-residential genre. In such circumstances, those who disagree with the notion that foreign buyers have any influence on the domestic land market are of the view that that prices in these two segments could hardly be correlated. Of course, it is quite

possible that where perfect knowledge exists about the alternative uses to which a piece of land can be put and how much buyers are willing to pay for it in its different uses, the land prices are likely to be influenced accordingly. Given the past and present structure of South Africa's agricultural sector, with the sharp dichotomies between rural and urban areas, small-scale and large scale, commercial farmers, and modern agriculture and communal land use systems, it is doubtful that such perfect knowledge and information about prices and alternative investment possibilities would be in existence.

In all these, sight seems also to be lost of the fact that South Africa is easily the only place in contemporary history where a significant degree of buying power has been accorded to a large majority of the population that previously did not participate in the market. Following the first democratic elections in the country in 1994, the black population that was previously excluded from the country's economy became major actors. One interesting aspect is that these new entrants came with substantial incomes which placed them within the medium-income cadre. What is being seen as foreign influence may indeed be partly explained by the sudden appearance of a large number of highly-paid black executives during this period. These individuals have been unleashed on the market within a relatively short space of time and are evidently desperately trying to "catch up" on lost or denied privileges and consumption levels and patterns previously reserved for and accessible only to the white population. It is highly unlikely that this phenomenon will not have a distortionary effect on the market.

As already explained, only a proxy is available at this time to attempt an investigation into a possible influence of the investment preferences of foreigners and the levels of farmland prices. The proxies of short-term and long-term foreign liabilities of private non-banking sector used here to approximate capital in-flows that meet the definition of "portfolio inflows" (including both bond and equity flows) have the obvious limitation that they also include other investments. But this is in the nature of proxies which can at best only obliquely measure the phenomenon of interest. Nonetheless they remain valuable because they include investments in farmland among other property and investment possibilities where it is not feasible, largely due to time constraints, to

obtain more precise data. As indicated earlier, the records of the Deeds Registry are as yet not disaggregated enough to allow for the full separation of foreign and local buyers of farmland.

Based on the accepted expert definitions, the short-term capital inflows are the appropriate measures for this investment behaviour, but the long-term measure is also included in the model for two reasons. One reason for including the long-term foreign capital inflows is that it will help in evaluating the performance of the appropriate measure. Another reason is that it represents an injection of funds into the income stream and is likely to have an impact in its own right, one way or the other.

The two scenarios of policy environment are considered as usual. In the absence of policy effect, the model predicts a highly significant positive relationship between short-term capital inflows and real farmland prices (Table 5.1). However, when the policy environment is explicity considered, the relationship becomes insignificant statistically while remaining positive. The graph presented in Figure 6.6 also suggests a positive relationship between the two variables over a considerable period of time. What seems to be an aberrant behaviour of farmland prices in the last three years of the series is repeated here and one notes the apparent parting of ways between the two variables from about 2000 when farmland prices began to rise while short-term foreign capital inflows declined slightly. Despite the highly significant relationship in the estimation with no policy effect, it is necessary to exercise caution in interpreting the results because of the possibility of spurious regression given the high serial correlation observed in that case (DW=1.38). But the subsequent regression in which policy effects are assumed is better specified and has a much better fit and the results are more likely to mirror reality to the extent that they predict a positive relationship. One notes that government has cautioned restraint in dealing with the matter and indicated its hesitance to impose a moratorium on land sales to foreigners. Such a move obviously reflects a recognition of the sensitive nature of the matter in terms of international relations and a determination to err on the side of caution when information is still rudimentary. It is highly probable that government action reflects the uncertainty about the nature of the relationship between farmland prices and foreign land purchases. The results of this study cannot be anything but tentative at this stage. The results

are also unlikely to capture the phenomenon with any degree of precision since only a proxy that includes other investments and capital flows has been used in this case. To that extent, the analysis does not provide sufficient support for the current concerns about foreign buyers.

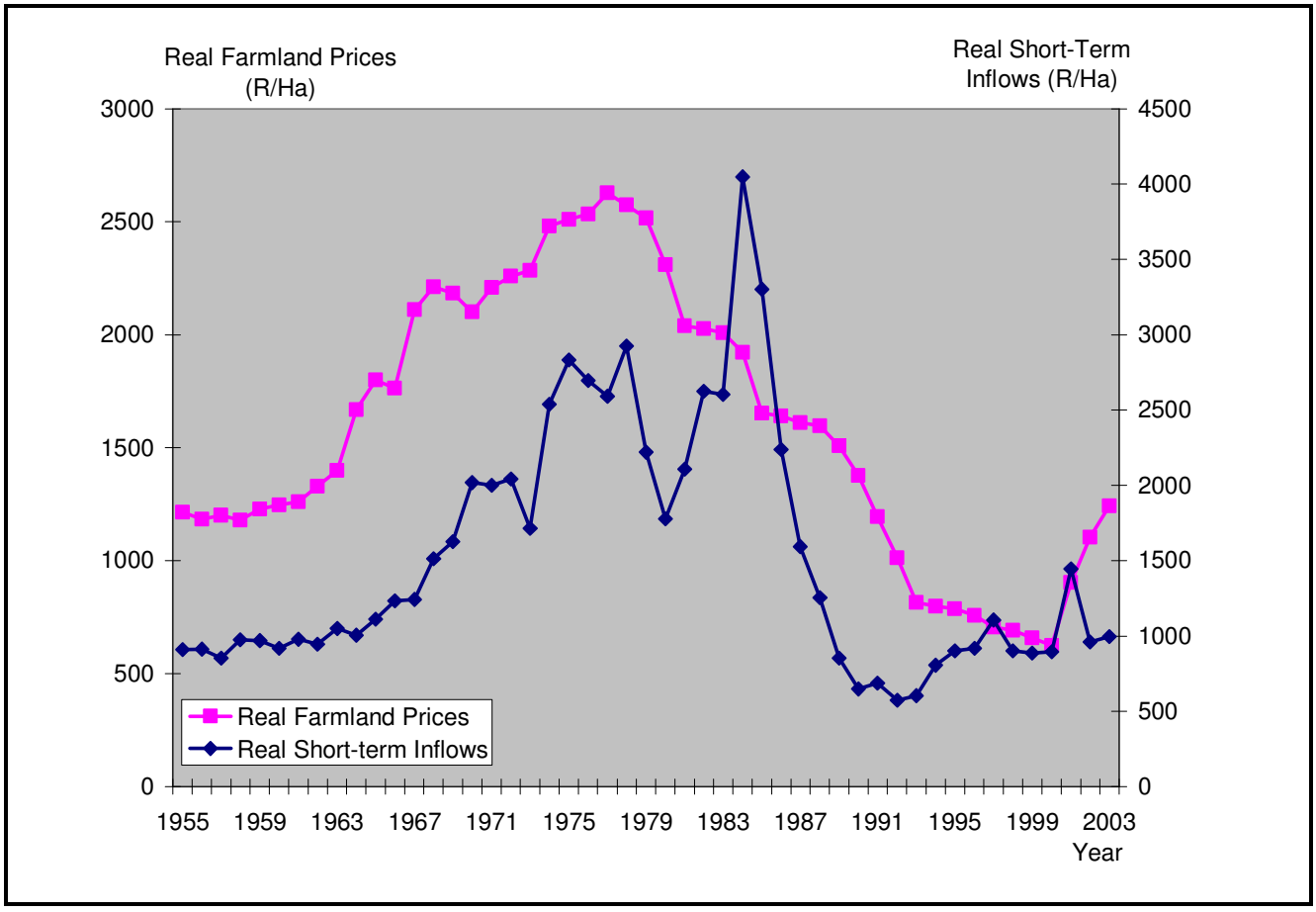

Figure 6.6: Real farmland prices and real short-term capital inflows (1955-2003)

But as an exploratory investigation at this stage, the results definitely point the way to the kind of analyses that need to be done to better explain the phenomenon and provide a stronger platform for policy on the question of foreign ownership of land in South Africa. More directly relevant data on how much exactly is being spent by foreigners to purchase farmland in South Africa are needed. As a starting point, the existing data maintained by the Reserve Bank can be disaggregated to its components to obtain useable time series data on foreigners' expenditures on farmland purchase. New data resulting from the assumed current attractiveness of South African land market as an

investment destination for foreigners can be collected directly as part of the routine documentation of land transactions by the Deeds Registry. Such information can be introduced into a model to assess the relative impacts of the expenditures of foreign and local buyers of farmland before a decision can be made one way or the other.

Figure 6.7 presents the relationship of farmland prices and real long-term private foreign capital inflows. According to Figure 6.7, an inconsistent pattern of relationship seemed to have prevailed between the long-term capital inflows and real farmland prices over much of the observation period. The initial relationship appeared to be a negative one followed by a period when the two variables seemed to be moving in the same direction. This pattern of relationship lasted up to about 1988. Subsequently, the two variables moved in opposite directions up to 2001. For just one year, 2001-2002, a positive relationship seemed to have prevailed while a negative pattern resumed in the last year of the series. While the initial OLS regression that ignored policy effects detected a weak negative effect for this variable, the subsequent OLS regression suggested a much stronger negative relationship. As a basis for validating the other variable, namely the short-term capital inflows, this result is clearly a powerful one since it contradicts both theory and intuition.

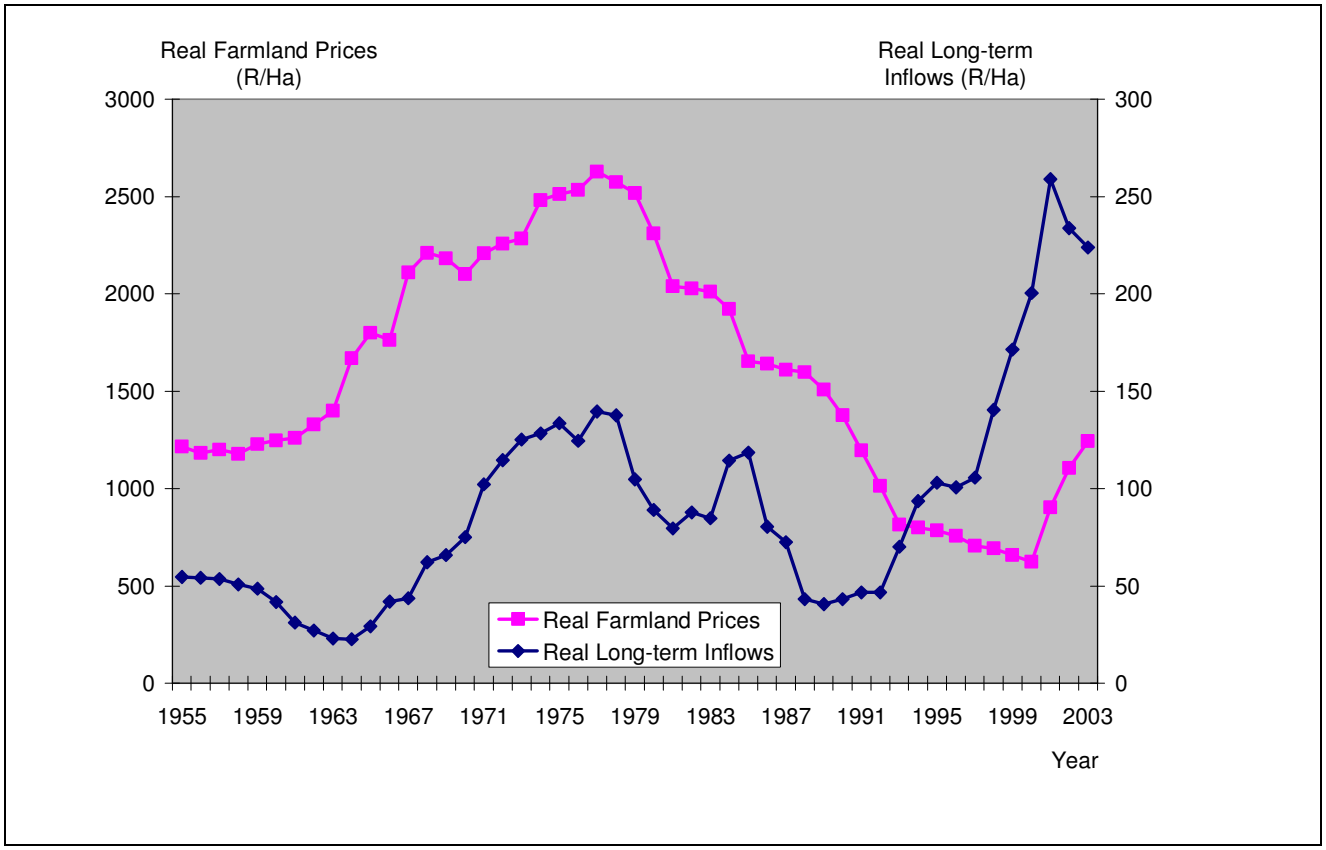

Figure 6.7: Real farmland prices and real long-term capital inflows (1955-2003)

To further explore the relationship between the short-term capital inflows and farmland prices, the variable likely to have the most important influence on foreigners' investment decisions, namely the real exchange rate, was plotted with the short-term inflows to see if there is a clear pattern between them. Figure 6.8 attempts to ascertain such a relationship. As the graph shows, the capital inflows seemed to be strongly influenced by the level of the real exchange rate; at low real exchange rates, the inflows are high and vice versa. It is therefore probably true that the foreign land buyers are encouraged by the exchange rate differences to move their capital into South Africa. It is probably also true that, should foreign buyers turn out to be an important factor in the determination of real farmland prices, the income advantage enjoyed by foreign buyers as a result of differences in exchange rate would most likely be the key driving force which enhances their purchasing power relative to the local buyers in South Africa.

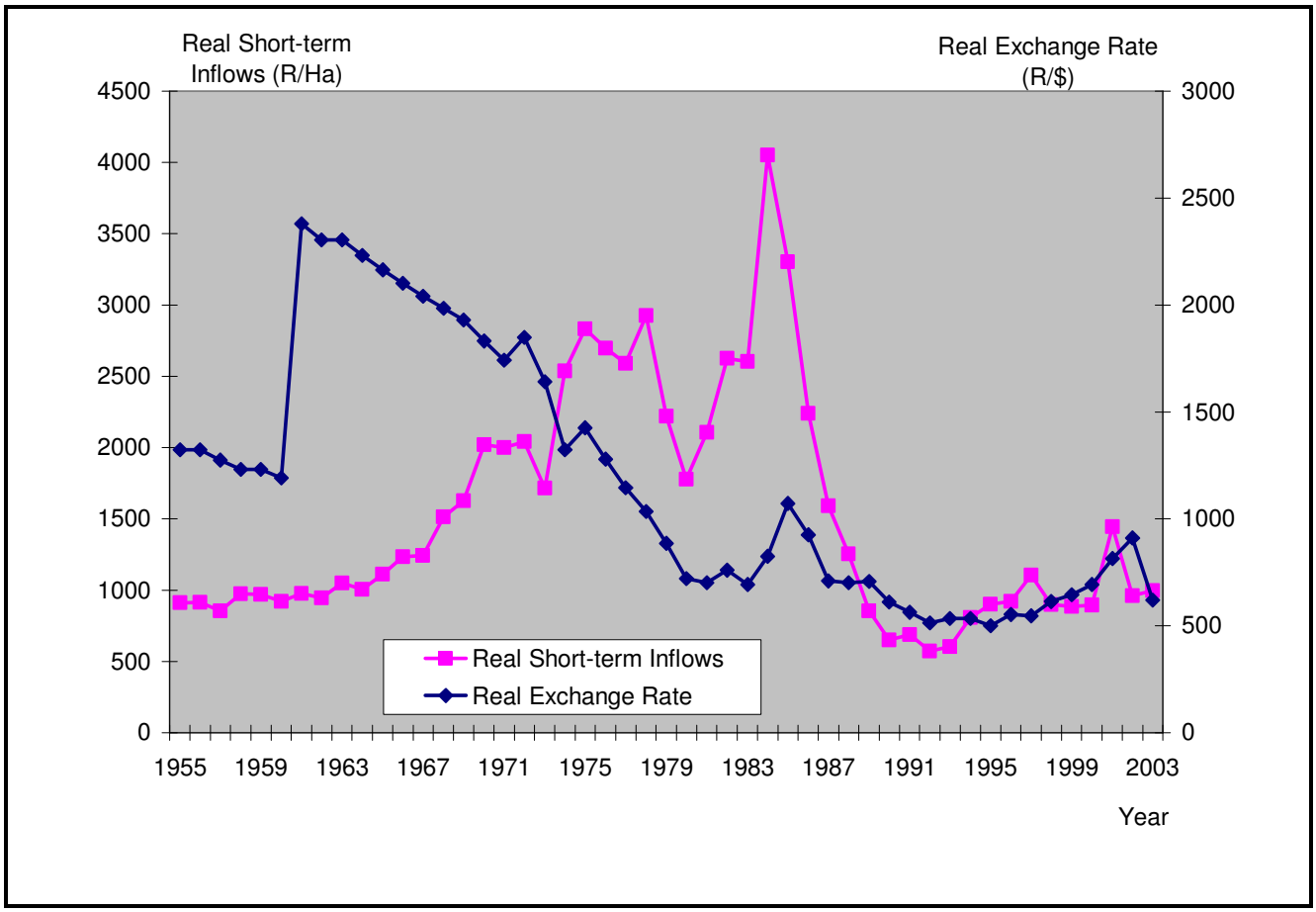

Figure 6.8: Real short-term capital inflows and real exchange rate (1955-2003)

As this study was being wound up towards the end of 2006, this subject continued to generate immense controversy. While early in the year, government position seemed unambiguous and remained unwavering from its initial deliberate and circumspect approach to the matter, some confusing signals began to emerge as the year ended. Earlier in the year, while addressing the National Council of Provinces, a parliamentary forum comprising nine provincial delegations and the South African Local Government Association (SALGA), the Deputy Minister for Land and Agriculture, Mr. Dirk du Toit, declared that there was no immediate decision to freeze land sales to foreigners (Business Day, 2006). The Deputy Minister acknowledged that government had received the recommendations of the Ministerial Task Team chaired by Professor Shadrack Gutto, a legal academic based at the University of South Africa (UNISA), which had called for immediate moratorium on land sales to foreigners. According to the Deputy Minister, the government was

thinking of measures to be implemented in future to regulate speculative activities in the land market (Business Day, 2006). However, on 7 December, 2006, an announcement by the government in connection with the release for public discussion of a draft bill entitled the "Integrated Coastal Management Bill" was erroneously interpreted as an initial step towards a legislation to limit the access of foreigners to South African land (Reuters, 2006). A quick and prompt retraction was immediately issued and the appropriate apologies followed. But the vast amount of publicity and concern that announcement generated in such a short time only went to show that the matter remains a very touchy and sensitive one which must be well-researched and thought through before action is taken.

6.2.2.5 Real GDP Per Capita (rgdpc)

The real GDP per capita is plotted with the real farmland prices in Figure 6.9 and shows a generally positive relationship between the two variables. The estimated equation (see Table 6.1) equally predicts a positive long-run relationship between the real Gross Domestic Product per capita and real farmland prices regardless of the policy scenario. This is obviously a very important finding to the extent that per capita GDP indicates in a general way the ability to pay within the economy. The variable shows how much of the economy's wealth each individual can receive if all were shared without consideration of any qualifying criteria. The results equally show that the relationship is highly significant. As a measure of economic performance, there is no question that the GDP per capita has its limitations, including the fact that it does not discriminate between those who actually spend the national wealth and those who do not (such as children and the other economically dependent segments of the population). Importantly, not all national wealth is actually re-injected into the stream because ability to pay does not necessarily translate to willingness to pay. The fact that a highly significant association is detected in this study attests to the strength of the variable. It also allows for conclusions to be drawn about the impact of other macro-economic variables not considered in this study to the extent that they have an impact on GDP per capita through which they can exert their influence.

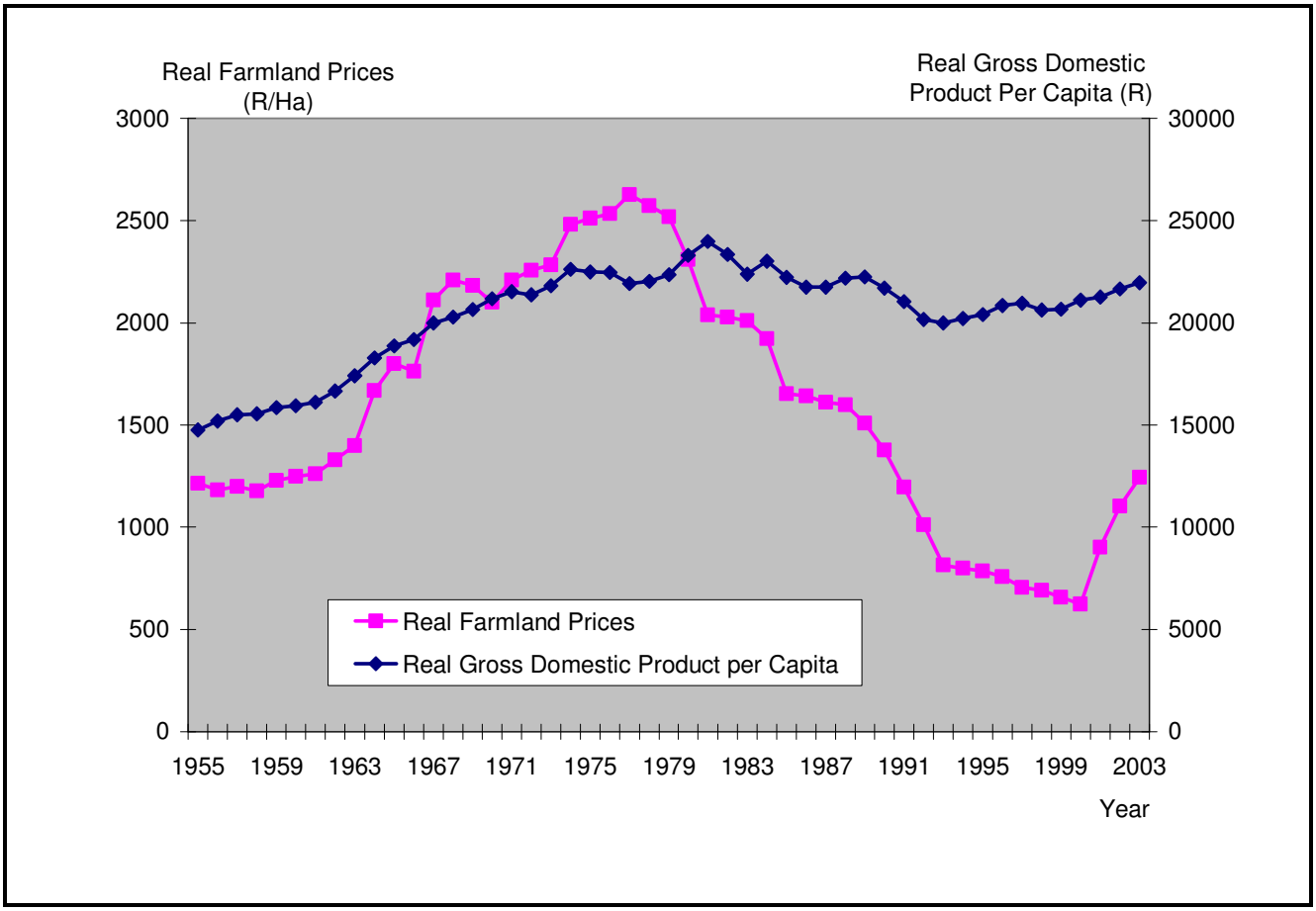

Figure 6.9: Real farmland prices and real GDP per capita (1955-2003)

Another significance of the present result is probably to call to question the notion of the "two capitals" and the phenomenon of "economic minority rule" that prevails and probably engenders the thinking that the behaviour of the South African agricultural sector sometimes departs from economic theory. Such thinking was probably what prompted the remark credited to the renowned historian C.W. de Kiewiet that "the country is farmed from the two capitals" (Jeeves and Crush, 1997). Due to excessive regulation and support of the sector by government, it has often been claimed that conditions in the sector have less to do with the market forces (Jeeves and Crush, 1997). This sort of surprising result is similar to the situation where the South African economy that is growing at a comfortable 5% and more presents one of the worst unemployment pictures in the world today (UNDP, 2003; Sunday Times, 2006; among others).

Rising GDP is symptomatic of a healthy economy. A presumption that the market fundamentals are at the right levels will be in order. As we determined in Chapter 4 in setting up the theoretical model for this analysis, land price is a function of a set of market fundamentals as well as a speculative element. A booming economy would be consistent with increasing confidence in the economy which might translate into increased investment as well as increased mobility of assets. In such an atmosphere, we can expect that a larger volume of land transactions would automatically lead to higher land prices. If both sellers and buyers are willing and equally enthusiastic to transact in the land market, the tendency might be for prices to move more towards an equilibrium level, that is generally downwards. Interestingly, real farmland prices in 2003 were at about the same level that prevailed in 1955. Such a long-term downward movement of the farmland prices is also mirroring the long-term decline in the real GDP per capita in South Africa, confirming the positive relationship between the two variables. Since no other recent studies have specifically examined the relationship between GDP and farmland prices, it is not possible to directly relate this finding to any contemporary precedent. However, it will be interesting to track and examine this relationship further and with a longer time series.

6.2.2.6 Rate of Inflation (infl)

The rate of inflation is one of the best known factors in price determination since it reflects movements in the general price level and affects costs of production and other aspects of economic activity. According to Van Schalkwyk (1995), the rate of inflation that grew quite rapidly in the 1960s and 1970s in South Africa was thought to account for some of the increases in the price of farmland during that period. That research found that both real farmland prices and rate of inflation moved in step with each other most of the time, parting ways only for brief periods over the sample period.

The evidence from the present study supports that finding. Up to the late 1980s, inflation was going up and real farmland prices behaved similarly (Figure 6.10). Since attaining a peak in 1986 or so, inflation has been trending downwards, and so was real farmland prices until 2000. It is therefore to

possible to confirm from visual inspection that a positive relationship exists between rate of inflation and the real farmland price.

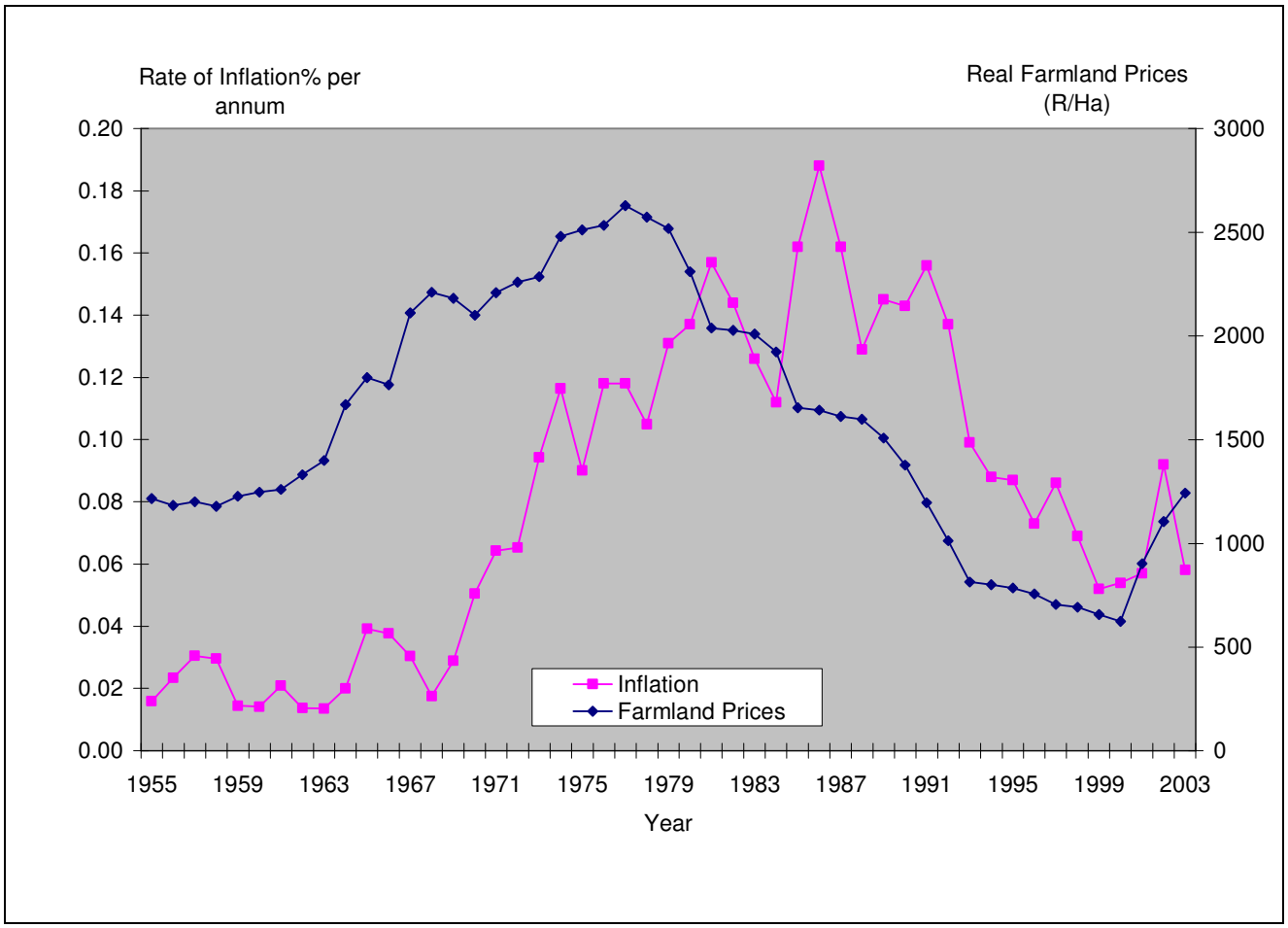

Figure 6.10: Real farmland prices and inflation rate (1955-2003)

The model predicts a negative relationship in the absence of policy effects but a positive one under assumption of policy effects. According to Table 5.1 above, the negative relationship was shown to be highly significant. But the fact that that equation is misspecified and suffers severe serial correlation means that this result cannot be taken too seriously. On the other hand, the estimation of the equation presented in Table 6.1 suggests a positive relationship although this was not statistically significant. Economic theory would predict that, other things being equal, investors would use land as a hedge against inflation, holding assets in the form of land rather than cash

whose value is being eroded by the inflationary trend. This would mean that a positive relationship would prevail between the two variables as demand for land continues to expand with rising inflation rates. The relationship is also expected to be significant in an unfettered, free-market environment. Incidentally, the South African situation over the observation period did not seem to meet these conditions as a whole lot of policy effects may have exerted their influence on the market, thus over-shadowing the effect of inflation. Beyond 2000, the relationship seemed to have been both positive and negative; as the real farmland prices started to move up after 2000, rate of inflation also turned upward. But from about 2001, while the real farmland prices continued to move up, the rate of inflation has started to edge downwards, rather sharply, suggesting that the sudden increase in real farmland prices from 2000 may not have been strictly inflation-driven in the first instance. This may equally lend further weight to the overall model prediction that the relationship between the variables is not significant.

In Table 6.1 two variables, namely the dummy variable representing land transfers to the black population following the change of government in 1994, and the data series on the real rate of exchange, aimed more specifically to ascertain the impact of the land reform measures and foreign macroeconomic developments which are representative of important policy regimes. A cointegration study of land prices in the United Kingdom by Lloyd and Rayner (1990) suggests the sign of the relationship between inflation and farmland prices could change depending on the policy regime. A negative inflation effect on farmland prices was observed during the early 1970s in a study in the UK (Lloyd and Rayner, 1990). This phenomenon seemed to have prevailed in the present study.

According to Trivelli (1997), inflation can have a double effect on the level of farmland prices. At one level, there can be a speculative effect when inflation erodes values of other assets so that land becomes more attractive as a store of value and people would tend to purchase more land which would tend to bid farmland prices up. The other effect could work through the action of inflation on output prices which go up as a result of inflation and so increase the demand for land due to the rising value of marginal product of land. While these are all positive effects on farmland prices,

neither of these two situations could have prevailed in South Africa, at least since the 1990s. As is well known, the land market is a constrained one in which transfers are heavily influenced by intense public sector intervention under the programme to redistribute land to the black population. For that reason, it is inconceivable that speculative demands can be so freely expressed to a level that would drive farmland prices upwards in any significant way. In respect to output prices, the truth is that prices of most agricultural commodities have actually been going down in the 1990s and 2000s. This has been the case with respect to maize as mentioned elsewhere in this thesis. That this does not translate into declining real land prices during 2000-2003 is probably reflective of the influence of other factors which may have simultaneously affected the South African land market during the period, including government's presence in the land market in the form of the various transactions under the land reform programme featuring numerous policy instruments and actors that one way or the other affects the level of farmland prices.

6.2.2.7 Real Exchange Rate (rsaus)

Data on real rate of exchange is maintained by the Reserve Bank of South Africa for the South African currency (the Rand) and the currencies of its major trading partners. From the early days of foreign exchange management in South Africa, the US dollar has been the international currency of choice for determining the international value of the domestic currency especially as the bulk of the country's foreign transactions are conducted in that currency (Van der Merwe, 1996). As already highlighted in Chapter 5, the exchange rate of the Rand with the US dollar was also preferred because ample information exists for developing a time series of reasonable length for this variable. The alternative variable is the real effective exchange rate which is the weighted average exchange rate of the Rand based on trade and consumption of goods and services between the country and its dominant trading partners (Walters & De Beer, 1999). But the Reserve Bank maintains this variable only from 1971, requiring that the data for earlier periods be estimated based on assumptions that will be difficult to standardize in order to build consenus around the computed rates. In any case, given the dominant role of the US dollar, it seems to be highly correlated with all other currencies so that any changes in international competitiveness of the South African economy will be captured

by the changes in the dollar. The relationship with real farmland prices is graphed in Figure 6.11 for the rand cost of the foreign currency. The indication is that the two variables are positively related. Over the range for which both variables have data, it is clear from Figure 6.11 that real farmland prices varied consistently with the real rate of exchange.

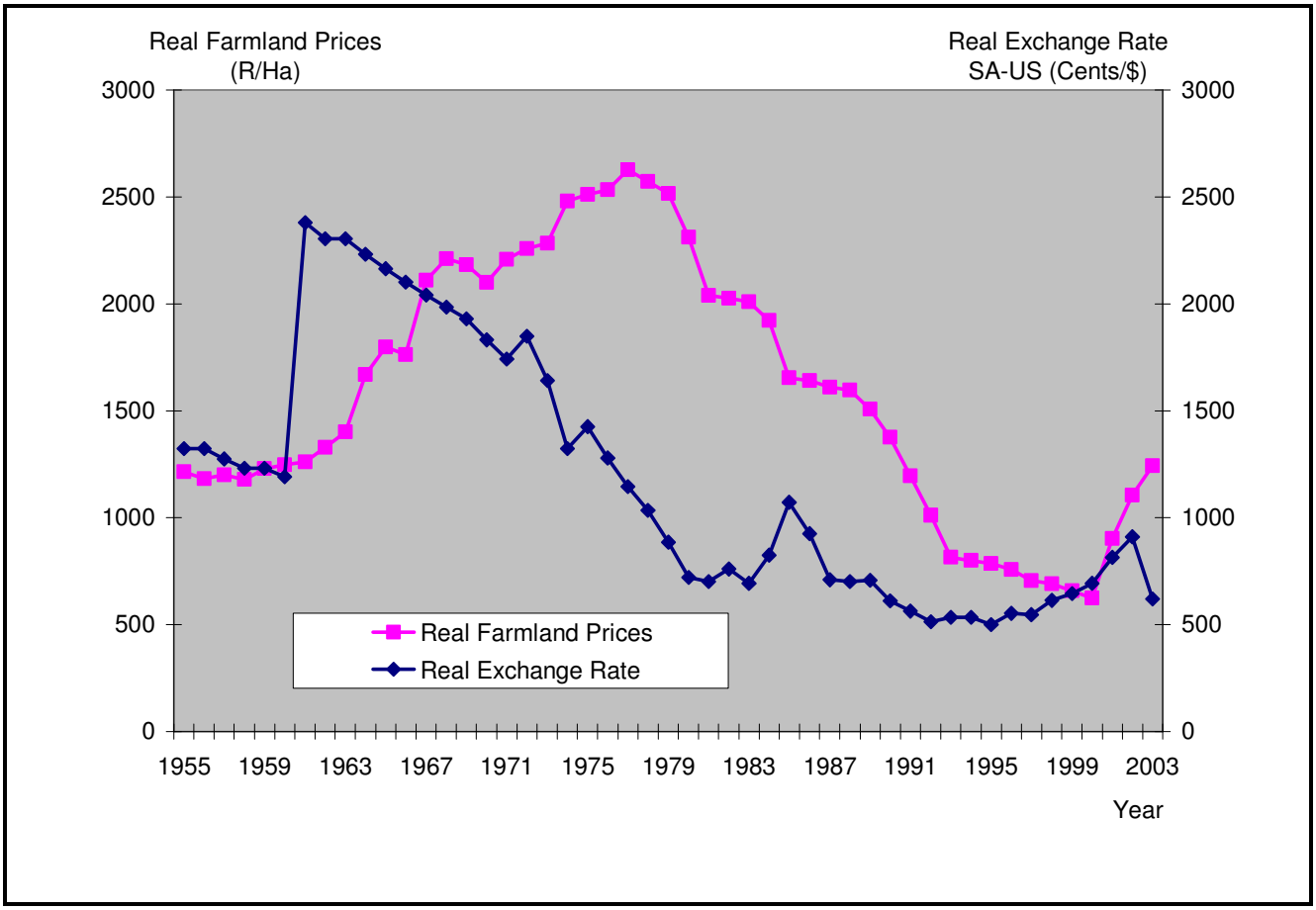

Figure 6.11: Real farmland prices and real exchange rate RSA Rand – US$ (1955-2003)

Figure 6.12 shows the relationship between the real exchange rate based on the dollar cost of the domestic currency. Again, a positive relationship is suggested over a large part of the data range. For instance, in the period up to 1975 when the country implemented the fixed but adjustable rates systems, the two variables moved in the same direction. However, for the next 10 years up to about 1985, the two variables moved in opposite directions, with the dollar value of the local currency going up while real farmland prices declined. This period coincided with an erosion in value of the

domestic currency, leading to the picture that both a decline and an increase in real farmland prices can accompany the weakening of the domestic currency. This is probably because the real farmland prices are influenced by other factors which may be completely unaffected by the real rate of exchange prevailing at any point in time. Interestingly, towards the end of the data range, the rand was weakening and was accompanied by an increase in the level of real farmland prices.

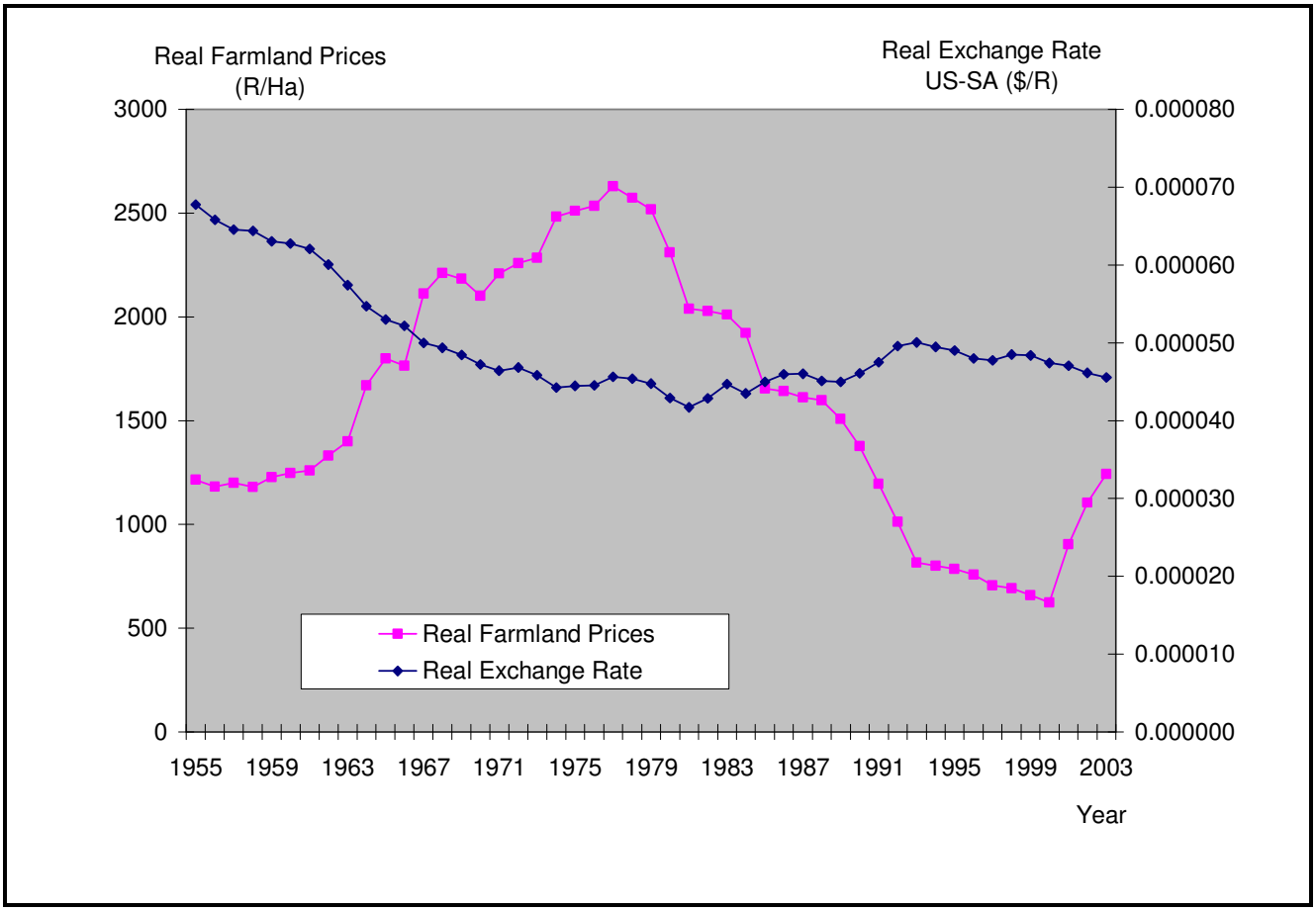

Figure 6.12: Real farmland prices and real exchange rate - US$ - RSA Rand (1955-2003)

The relationship suggested by Figures 6.11 and 6.12 is consistent with the model prediction of a negative relationship between farmland price and real rate of exchange under the assumption of policy effects (see Table 6.1). The relationship was also shown to be statistically significant. Under the assumption of no policy effect, the relationship is positive but not statistically significant. These results reflect the uncertainties that characterize the domestic economy confronting a rapidly

changing global environment. In the sample period, the rand has undergone appreciations and depreciations. A rising real rate of exchange reflects a strengthening of foreign currencies against the Rand and vice versa. If the Rand is becoming stronger, domestic goods and services will be more expensive to foreigners than would otherwise be the case. Conversely, a weakening Rand will make domestic goods and services cheaper to foreign buyers. With the strong export orientation of South Africa's commercial farm sector, these effects are very important. In Figure 6.8 it was shown that a positive relationship exists between the real rate of exchange and the private capital in-flows of foreign buyers. It is therefore possible that, among other effects, the level of foreign exchange works through its effect on the purchasing power of foreign buyers to influence farmland prices positively.

6.2.2.8 Land Transfers to the Black Population (lndtr)

Prior to 1994, all land transfers recorded by the Deeds Registry referred to transactions within the commercial agricultural sector dominated by the white farmers. Based on available information, little or no such transactions were taking place within the communal agricultural sector in the parts of the country designated either "self-governing territories" or "independent homelands". In those communal areas, the tenure system was predominantly traditional and remains largely so today. As a consequence of this, the current policy thrust is to reform the tenure systems within the communal areas through programmes such as CLARA (see details in Chapter 2 in respect to the discussion on the restitution component of the South African land reform programme).

In the absence of time series data on transfers to the black population, a dummy was used to reflect transfers from 1995 and the increased pace of transfers following the introduction of LRAD from 2000. This is obviously a crude way of capturing changes that have occurred in the racial pattern of land ownership in South Africa in the wake of democratic rule. There is evidence that different parts of the country have experienced the changing ownership patterns differently. Similarly, the effect has differed depending on the land use system in existence in different parts of the country. While such regional/spatial effects are important and will provide useful policy-relevant insights, this

study simply aimed to cursorily examine the phenomenon more generally to see if there is need for deeper investigation.

Figure 6.13 relates real farmland prices to the land transfer variable based on the assumption of two scenarios of land transfer intensity (slower at the beginning and faster after 1999/2000) while Figure 6.14 relates both variables on the assumption that there were no differences between the two periods in terms of the pace of land transfers. In both cases, the results suggest that transfers to the black population definitely did not influence anything in the period preceding democratic elections in 1994 since such transfers did not occur at all.

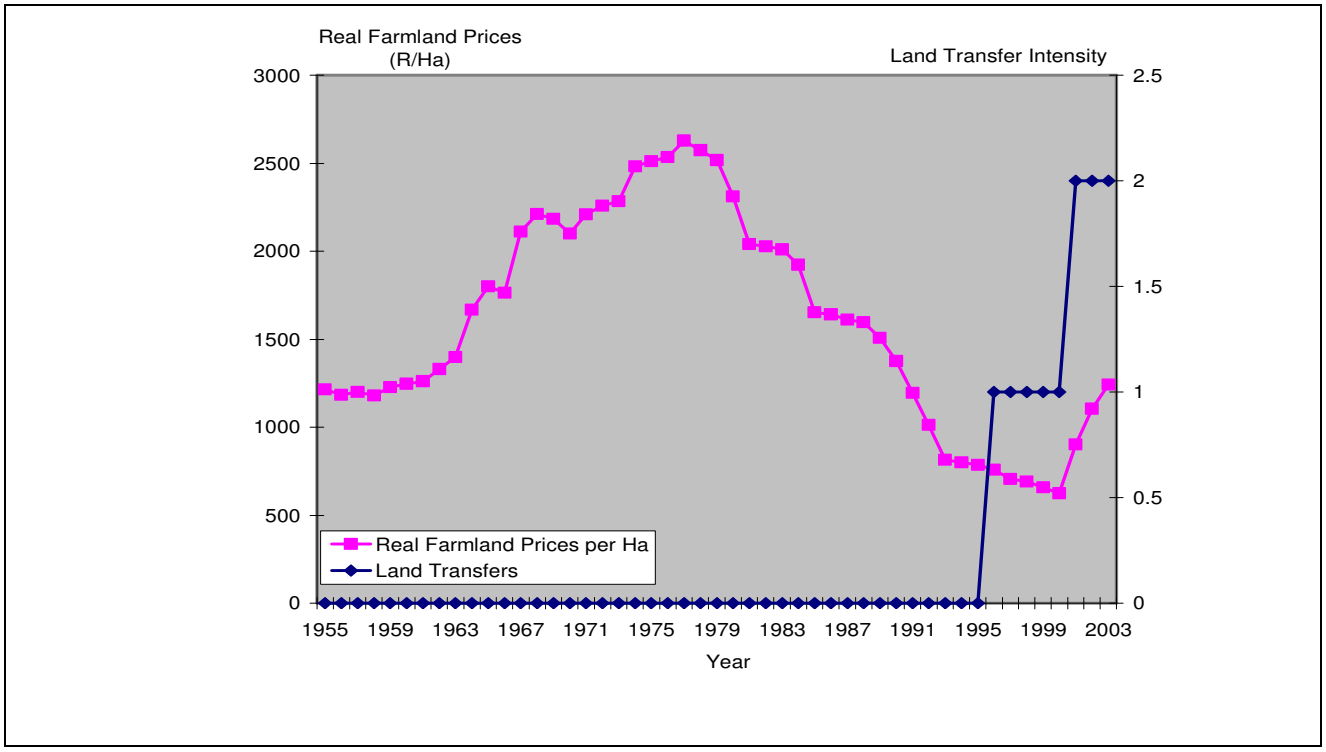

Figure 6.13: Real farmland prices and land transfers with increased pace after 1999

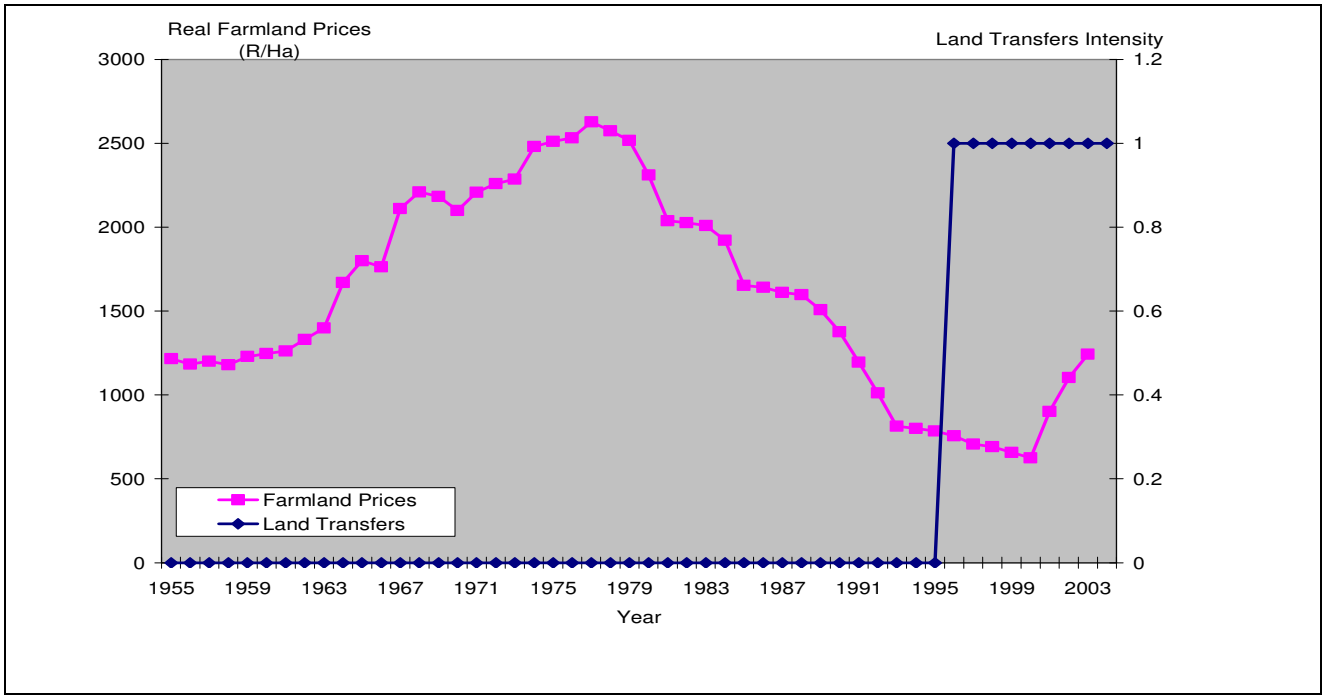

Figure 6.14: Real farmland prices and land transfers with no change in pace from inception

The graphs suggest that in the time the transfers have been taking place, a positive effect on farmland prices may have occurred, most probably from 2000 when a more aggressive redistribution system came into force.

Intuitively, land transfers can reflect two things. In the first place, they can reflect the expansion of demand for more land which should be expected to put an upward pressure on farmland prices. Second, land transfers can be a response to declining agricultural productivity or incomes which will force farmers to sell land and move to other sectors. In that case, such transfers would be associated with declining farmland prices. The model does predict a negative and mildly significant relationship between land transfers and farmland prices. Since the land transfers to the black population are taking place within the context of the on-going land reform programme, this finding might form a basis for a preliminary evaluation of the programme. The variable can impact on real farmland prices through the absolute volumes of land transferred or the pace at which transfers are taking place. There should be important lessons to learn from undertaking a deeper investigation of this issue.

From available information, it does not seem that volumes of land transferred have come anywhere close to what can really exert a perceptible impact on farmland prices. There has been widespread criticisms of the pace of land transfers as well. Recently, a directive has been issued about the maximum time to negotiate transfer between parties in a land transaction. While the need for urgency in settling the land question is incontestable, the land valuation and pricing which must precede such transfers are specialized activities which require skilled manpower that are currently in short supply. The panic to achieve larger volume of transfers may mean that initial business planning is not done properly and probably accounts for the large number of failures of the newly resettled farmers. Parallel programmes to enhance land valuation skills and support farmers skills acquisition may be more important for the success of the programme. In any case, actual data on number of farms and total area transferred would be necessary as a firm basis for any strong prediction about the long-term relationship between these two variables.

6.3 Unit Root Test on Residuals and Analysis of Policy Effects

After estimating the long-run equation by OLS regression as shown above, the residuals are saved and unit root test applied to them. Pesaran and Pesaran (1997) prescribe the Hypothesis Testing option on the Microfit post-regression menu for testing the residuals for unit root. The alternative is to type the expression for the saved residuals in the command editor and apply the ADF (Augumented Dickey-Fuller) test. Using the E-Views package, the residuals resulting from the OLS estimation of the variables in levels are saved and tested directly for unit root in the same way as individual variables are tested. This latter approach was followed in this study. A significant test on the residuals would mean that the underlying equation is well-estimated in the sense that serial correlation is absent.

Guidance on the number of possible policy scenarios to assume is provided by the results of the structural break tests performed earlier in this Chapter (see Tables 5.3 and 5.4 above). Two sets of possibilities can be considered: one in which it is assumed that there is no policy effect whatsoever and the other in which specific policy landmarks are assumed. In the latter case, there can be a

number of landmark periods as suggested by the structural break tests. There is the period up to the end of the 1970s when agricultural support was at its peak in South Africa. A second period when substantive policy impact can be assumed is the period immediately preceding the full imposition of economic sanctions by the Western democracies such as the United States of America and the United Kingdom to force an end to Apartheid rule. Whether or not these actions reflected on the data stands to be confirmed, but some indication in the series was found that 1984 could have been an important turning point. Another period with possible effect on the data is the end of the apartheid era. This is possibly a protracted period that may have started in the late 1980s as Van Schalkwyk (1995) observed, and lasting through the period of negotiated settlement and into the current era of full agricultural deregulation along with democratization. In Table 6.2, these periods have been designated P1, P2, and P3, respectively. The OLS estimations were run on the data set with annual dummies as follows: for P0, no annual dummies were included, for P1, the annual dummy for 1975 was included based on the results of the OLS estimation presented in Table 6.1, for P2, all annual dummies up to 1984 were included, while for P3, annual dummies were included up to 2002. The results of unit root tests on the residuals are shown in Table 6.2.

Table 6.2: Results of unit roots tests on residuals of long run equation under alternative assumptions of policy effects

Policy Effect Assumptions	Test Statistics	Critical Values			Durbin-Watson Statistics
		1%	5%	10%	
P0 (no annual dummies)	-5.06	-2.61	-1.95	-1.62	1.76
P1 (up to 1970s)	-5.05	-2.61	-1.95	-1.62	1.76
P2 (up to 1984)	-4.21	-2.61	-1.95	-1.62	1.59
P4 (up to 2002)	-7.35	-2.61	-1.95	-1.62	2.04

*, ** and *** stand for level of significance at 1%, 5% and 10% respectively

The results in Table 6.2 suggest that all the policy scenarios were important. Major turning points identified through the estimation process were 1975, 1984, and 2002. The results suggest that while all these periods may have important influences on real farmland prices, the two most important turning points were probably the mid-1970s and 2002. There was the expectation that 1985 would

be a major turning point in terms of the impact of the intensification of international sanctions against the Apartheid regime in South Africa. It may well be that such effects are captured by developments in the 1970s. The period preceding this turning point was marked by a significant amount of government support to agriculture under which white commercial farmers received wide ranging support in terms of easier and cheaper access to farm inputs and technical advice. On the other side of 1985, the erstwhile regime instituted measures to reduce government support to the agricultural sector. The limited black economic empowerment measures introduced in 1988 was probably a response to the growing international condemnation of the Apartheid policies during that period. In the former homelands a few black farmers were settled on land appropriated from white commercial farmers and measures were put in place to create a core of black commercial farmers under the programme with the active involvement of specially instituted parastatals (see Chapter 2 for details). Without a doubt, these and other measures may have influenced the nature of the data to a large extent.

According to Table 6.2, the other year with possible significant influence on the data was 2002. This is probably due to the fact that the large number of measures introduced by the new ANC government to restructure agriculture were now beginning to exert their influence on the relevant indicators. The new government identified the agricultural sector as one in which considerable amount of intervention was called for in order to reach the majority of the black population under a broad-sweeping poverty reduction programme. The land reform programme was established as soon as the new government had settled down in 1994 but the actual land transfers and associated support mechanisms only started from 1995. In 1996 the control boards were dismantled under a programme to fully deregulate agricultural marketing in the country. Numerous other policy measures were also instituted at this time. Since it normally takes sometime for economy management measures to work through the system to have their effects felt, it is understandable that 2002 can show up as a significant turning point. It is possible that many of these influences may have already started by the late 1990s. The ripple effects of the terrorist attacks in the United States on September 11, 2001, may also be important considerations in this respect.

6.4 Error Correction Under the Residual-Based Approach

Econometric theory requires that for the existence of co-integrating relationships to be confirmed, the residuals from the OLS regression estimates must be significant and must have a negative sign. Where this condition is not met, there will be no co-integration and the exercise is terminated at that stage with the conclusion that a long-run relationship exists while a short-run relationship could not be confirmed. Table 6.3 presents the results of the regression of the residual term which show that the conditions of a negative coefficient and high significance are met. Similar information is provided by the unit roots tests results presented in Table 6.2 above to isolate policy effects on the data. Similarly, the Durbin-Watson statistics are sufficiently close to the theoretical optimum of 2 to allow the conclusion that there is no serial correlation or first-order autocorrelation in the residual terms. Even the DW=1.59 for the turning point of 1984 exceeds the minimum acceptable level. It is therefore safe to proceed from here to investigate short-run relationships and conclude that there is cointegration, and possibly several cointegrating relationships in the estimated long-run equation.

As is well known, error correction allows for the adjustments in the dependent variable based on the deviations of the explanatory variables from their equilibrium relationships with the dependent variable (Banerjee, Dolado, Galbraith and Hendry, 1993). The error correction mechanism is a procedure for generating the parameters that best describe what happens to the relationships among a set of variables in the short run. So, the error correction model is the short-run equation of the relationship. Under the residual-based approach, error correction was achieved by running a univariate (OLS) regression with the differenced forms of the variables. As Table 5.5 shows, to achieve stationarity of all the variables, it was necessary to difference some of the variables once while others were differenced twice.

Table 6.3: Results of differencing of the residual term from the long run equation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESIDUAL TERM(-1)	-1.308485	0.140279	-9.327765	0.0000
R-squared	0.653871	Mean dependent var		3.865385
Adjusted R-squared	0.653871	S.D. dependent var		136.4719
S.E. of regression	80.29021	Akaike info criterion		11.63022
Sum squared resid	296539.8	Schwarz criterion		11.66958
Log likelihood	-272.3102	Durbin-Watson stat		2.368107

Table 6.4 presents the error correction results in which this once-differenced residual term was used as an explanatory variable. From the results, it can be concluded that this procedure is an efficient one. For instance, the residual term has the correct sign, being negative, and is statistically significant. In addition, the values of the regression coefficient (R^2), the adjusted R^2, and the Durbin-Watson (DW) statistic, are all within the accepted ranges (see Table 6.4). Results of the comparison of the actual and fitted values of the residuals as well as normality test on the residuals are presented in Figures 6.15 and 6.16, respectively. These results show a reasonably good fit for the estimated error correction model which also yielded a highly significant residual term with the required negative sign.

Turning to the actual regression results, Table 6.4 presents a number of interesting short-run relationships. While some of these relationships may or may not be in line with economic theory, they are easily explained within the context of South Africa's special post-Apartheid circumstances. For instance, the estimates suggest short-run positive relationships between real farmland prices and real interest rates on debt, real net farm income, real farm debt, real GDP per capita, and inflation rate. In two cases, namely the relationship with real net farm income and real farm debt, the results showed statistical significance. Contemporary experience bears out the results with respect to the influence of real farm debt while they are clearly consistent with economic theoretical expectations with respect to the real net farm income. The results with respect to real farm debt are clearly interesting since high debt levels would ordinarily suggest high rates of insolvency that would compel increased departures from agriculture leading to an increase in supply of land relative to demand. But there could be an increase in land market transactions taking place at the same time, leading to rising prices despite high levels of debt and low interest rates.

Table 6.4: Results of the OLS regression to estimate short-run equation (Error correction)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.928852	18.07948	-0.161999	0.8724
DRINTRD	37.78916	1014.947	0.037233	0.9705
DRNFI	0.764754	0.449219	1.702407	0.0987
DDRFDPH	1.330569	0.505375	2.632838	0.0131
DRFBSPH	-0.001365	0.049163	-0.027766	0.9780
DDRGDPC	0.029882	0.035254	0.847641	0.4031
DINFL	207.2092	1379.774	0.150176	0.8816
DRFBLPH	-2.093980	1.193369	-1.754679	0.0892
DRSAUS	-0.108931	0.061458	-1.772447	0.0861
DDLNDTR	-76.75204	61.68832	-1.244191	0.2228
RESIDLONG(-1)	-1.454068	0.242745	-5.990104	0.0000
DUMMY80	-247.0463	67.77248	-3.645231	0.0010
DUMMY82	642.7583	116.9061	5.498074	0.0000
DUMMY83	-381.4502	103.4527	-3.687193	0.0009
DUMMY01	464.0510	98.63816	4.704578	0.0001
DUMMY02	-620.4243	126.3402	-4.910745	0.0000
R-squared	0.732390	Mean dependent var		3.638390
Adjusted R-squared	0.602902	S.D. dependent var		132.1373
S.E. of regression	83.26732	Akaike info criterion		11.94668
Sum squared resid	214936.8	Schwarz criterion		12.57652
Log likelihood	-264.7470	F-statistic		5.656024
Durbin-Watson stat	2.473221	Prob(F-statistic)		0.000024

Again, if the results suggest that the real interest rate on debt has no significant effect on real farmland prices, it is probably because it also does not determine the level of liquidity in an economy with substantial state control of economic fundamentals. If, despite high interest rates that, in and of themselves, might constrain credit expansion, policies are still in place that lead to increased liquidity in the economy, then a possibility exists that asset prices may be bid up. As already highlighted earlier, low interest rates may discourage savings and therefore lead to higher liquidity in an environment where there is no significant income constraint. In either case, the effect would be the same and there would be the tendency for farmland prices to be rise as a result of the competitive bidding of investors awash with liquidity. It would seem that this is another area where government intervention is affecting the workings of the macroeconomy. This is probably an explanation for the apparently abberant phenomenon of rising farmland prices despite record low interest rates and high debt levels.

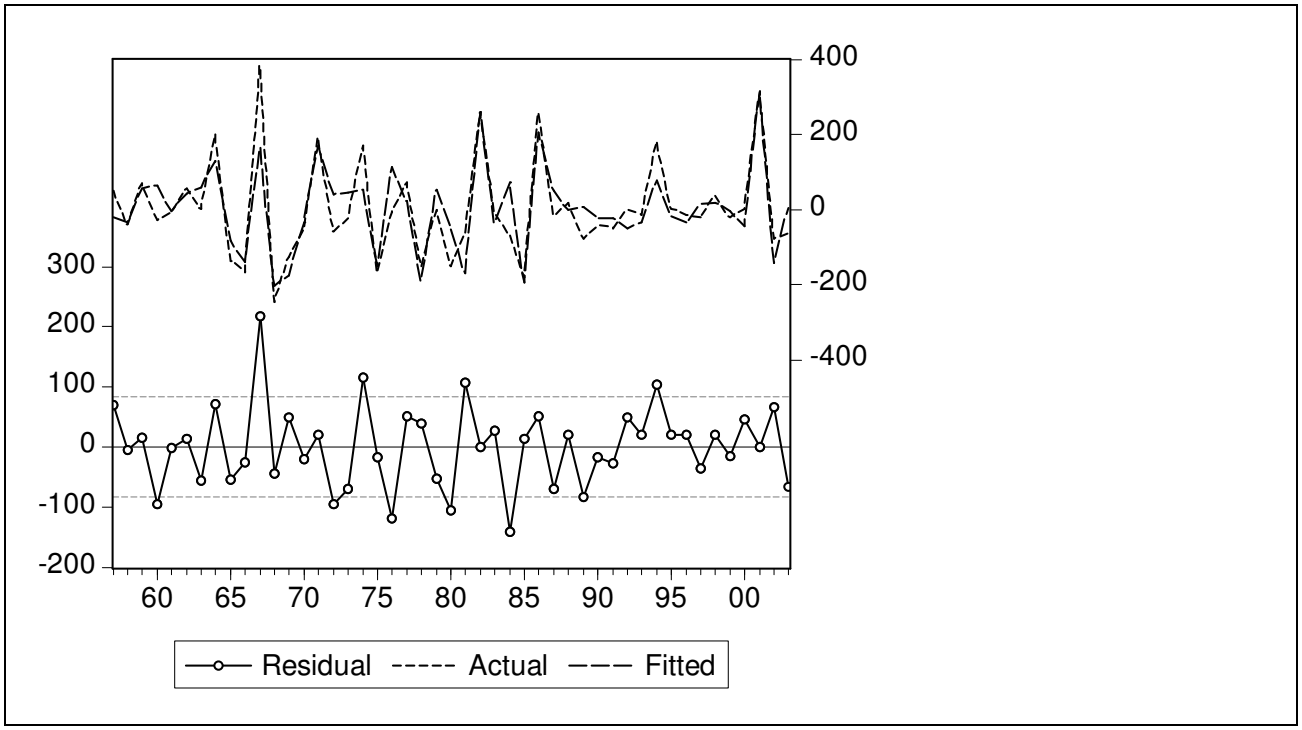

Figure 6.15: Comparison of actual and fitted values of the dependent variable and plot of the residual term for the error correction model.

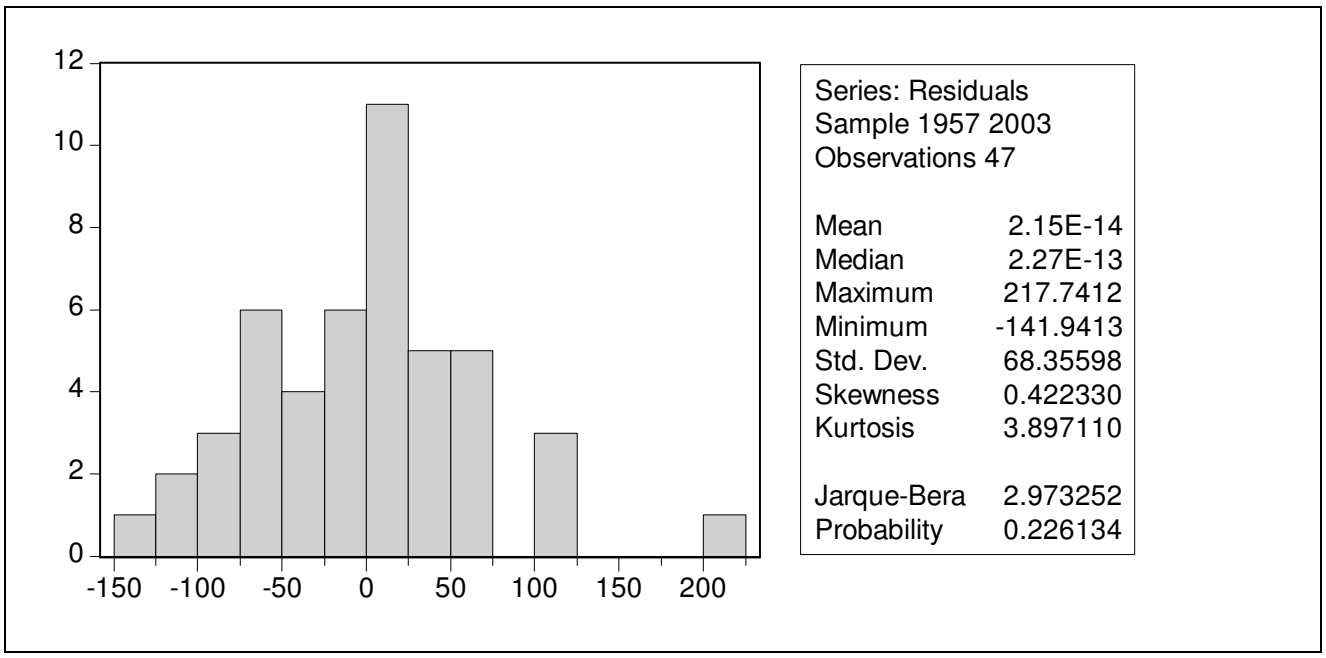

Figure 6.16: Test of the normality of the distribution of the residual terms of the dependent variable

In the case of real net farm income, it has been highlighted earlier that in the last three years, net farm income as measured by the Department of Agriculture has been falling whereas real farmland prices have been going up. Although this falls outside the observation period for this study, it reflects a phenomenon that has apparently been going on for sometime. One reason for this can be that declining returns may lead to farmers selling off land in a market that is still supply constrained. Prospective buyers may be seeing a prosperous agricultural economy in the future which they are enthusiastic to embrace. Agricultural prosperity is not difficult to observe and the estimation results of a positive, albeit weakly significant relationship between real net farm income and real farmland prices, is not surprising. The weak statistical significance is also understandable since the effect of real net farm income is likely to take sometime to work through the system to influence real farmland prices. Real farmland prices may have been boosted more by government policy and such macroeconomic factors like rate of inflation than anything else. As would be expected, rate of inflation was shown by the estimation results to have had a positive relationship with real farmland prices (Table 6.4).

Furthermore, the model reveals positive relationships between real farmland prices and real GDP per capita, but negative relationships with both short-term and long-term capital inflows, real exchange rates and land transfers. Regarding real GDP per capita, the short-run estimates suggest that while the relationship is positive, it is not statistically significant. While over the long term increasing real GDP per capita exerts a general impact on all sectors of the economy, including on real farmland prices, it may not have much short-term impact because increasing national wealth does not automatically translate to increased individual ability to pay. It is therefore understandable that in the long-term, real GDP per capita can have a statistically significant effect and fail to do so in the short-term. Again, the fact that real GDP has grown only marginally over the years could mean that within the short-term context the impact may be imperceptible. Over time, however, the impact of a generally upwardly bound GDP must definitely become less easy to conceal.

The matter of the influence of foreign capital inflows has been discussed elsewhere in relation to the long-run estimates. In this case, both types of capital inflows were shown to have negative short-run

relationships with real farmland prices. However, while the relationship with the short-term capital inflows was not statistically significant, the relationship with long-term capital flows was statistically significant, even if weakly so. This result probably implies that the impact of the short-term inflows may manifest over the long, rather than, immediate term. The argument put forward by commentators that the land market is segmented between the exotic, high-brow, tourism-related component preferred by foreign buyers and the component more suited to agricultural activities which are targeted by local buyers is probably true to the extent that no direct influence of one on the other is possible. But over time, the injection of foreign capital generally influences economic activities, not only in the land market but for other commodities. This is to be expected for an open economy in which foreign capital can produce multi-sectoral impacts. It may well be that the foreign influence on the farmland prices may actually be coming not so much from the land foreigners buy as the more economy-wide foreign investments that are a fact of present-day South Africa.

Real exchange rate was shown to have a statistically significant and negative relationship with real farmland prices. The role that a variable like real exchange rate can play in land price determination is likely to be mainly through foreign buyers whose foreign currency incomes are converted at rates that affect relative purchasing power. A negative relationship implies that when the value of the local currency declines, real farmland prices may go up since this represents an increase in real incomes for buyers whose incomes are denominated in foreign currencies. If the inflows make up a significant proportion of the total effective demand, then this effect would be quite pronounced. In this case, however, there is no indication that foreign buyers constitute a significant part of the relevant market, hence the rather muted effect. The result may also point up the important role government has been playing in the land market. While the changing macroeconomic environment could have produced changes in the level of real farmland prices one way or another, government intervention has a way of effectively insulating the market from the broader influences. Since the impact of the short-term foreign inflows is shown to be insignificant in the short-run, while the impact of long-term inflows are negative but only weakly significant, it is not surprising that the real exchange rate would also have no more than a weak short-run effect.

The final variable examined in the model was land transfers to the black population. As in the long-run estimate, this variable was shown to have a negative effect of real farmland prices. It is clear that, in and of themselves, the land transfers do not have much of an effect largely because they have been quite insignificant relative to the size of land to be transferred under the governments plan to transfer 30% of white-owned farmland to the black population. Apart from the volume of transfers, the pace of transfers (which would produce the same result ultimately) can theoretically have an effect on real farmland prices. But the pace has widely been criticized as slow, with stringent calls being made for a change of the approach. As noted earlier, in early 2006 government issued directives to the effect that the pace of negotiations must be increased to expedite transfers of land to persons with proven claims of prior ownership.

In the context of the purpose of the error correction mechanism in terms of correcting deviations from the long-run equilibrium, it was necessary to examine the coefficient of the lagged residual. The results in Table 6.4 show that the coefficient of the lagged residual is -1.45. Theoretically, this value represents the speed of adjustment to the long-run equilibrium. The indication is that, on average, nearly twice the deviations from the long-run equilibrium is compensated for within the following year. This is a plausible outcome given the rapid rate at which price information is usually transmitted and signals about changes in land market information are received by potential buyers as well as those who have land to sell.

6.5 Granger Causality Relationships

According to Granger (1986), when the dependent and explanatory variables are cointegrated, there must be some Granger Causality in at least one direction. The foregoing estimations and discussions have shown conclusively that some cointegrating relationships exist given the reasonably high DW values obtained both in the long run equilibrium estimates and in the error correction estimation. Table 6.5 presents the results of the Granger Causality Tests carried out on the long run model. Strong Granger causal relationships are revealed between real farmland prices and real interest rates on debt, real exchange rates, inflation rate, and short-term capital inflows. The test suggests that there could be Granger Causality in both directions in the cases of real interest rate on debt and rate

of inflation. Both intuition and theory would seem to support this finding which relates to the role of money supply in price determination, inflation and interest rate determination. The test failed to confirm Granger causality between real farm debt and real farmland prices in either direction although the level of probabilities suggest that real farmland prices are less likely to Granger-cause real farm debt than otherwise. This means that in inserting the real farm debt in the model, it is probably safe to hypothesize real farm debt as an explanatory variable as has been done in this study.

Table 6.5: Granger Causality Relationships

Pairwise Granger Causality Tests			
Sample: 1955 2003			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Probability
RINTRD does not Granger Cause RLPH	47	2.62477	0.08431
RLPH does not Granger Cause RINTRD		10.2799	0.00023
RNFI does not Granger Cause RLPH	47	1.25450	0.29569
RLPH does not Granger Cause RNFI		0.70103	0.50179
RFDPH does not Granger Cause RLPH	47	1.28237	0.28802
RLPH does not Granger Cause RFDPH		2.35089	0.10770
RFBSPH does not Granger Cause RLPH	47	0.01106	0.98900
RLPH does not Granger Cause RFBSPH		3.01385	0.05983
RGDPC does not Granger Cause RLPH	47	0.92489	0.40450
RLPH does not Granger Cause RGDPC		1.14156	0.32903
INFL does not Granger Cause RLPH	47	4.31667	0.01973
RLPH does not Granger Cause INFL		4.10935	0.02345
RFBLPH does not Granger Cause RLPH	47	0.44873	0.64146
RLPH does not Granger Cause RFBLPH		0.85757	0.43148
RSAUS does not Granger Cause RLPH	47	5.80288	0.00595
RLPH does not Granger Cause RSAUS		1.04703	0.35996
LNDTR does not Granger Cause RLPH	47	0.16469	0.84870
RLPH does not Granger Cause LNDTR		2.26197	0.11669

The unidirectional causality relationships revealed in the cases of short-term foreign capital inflows and real exchange rate are equally interesting. For instance, the results suggest that short-term capital inflows are more likely to Granger-cause real farmland prices than otherwise which is in line with hypothesized relationship even though the estimations did not pick up strong indications in this

respect. In the case of real exchange rate, the results suggest that real farmland prices are more likely to Granger-cause real exchange rate than otherwise which may be surprising but can be understood in the light of the estimation results of a negative relationship between the variables. Since real exchange rate may actually only be important to the extent that it influences foreign buyer decisions which do not seem to be as crucial as was feared hitherto. Also, the impact of real exchange rate in real farmland price determination is not expected to be quite important given that exchange rate are already captured in farm profits (Nieuwoudt, 2006). In the light of the foregoing, the results of the Granger Causality Tests are plausible

6.6 Chapter Summary

The main purpose of this chapter was to present the results of the estimation of the model in order to be able to make statements about the possible relationships among real farmland prices and its determinants. On the basis of the estimated equations, it was also intended to attempt a forecast of the real farmland prices, using their current and past patterns of behaviour as guides. In all, 10 variables were selected from a large number of variables considered on the basis of the vast literature on the subject, recent policy developments, and the prior modeling carried out by Van Schalkwyk (1995). Successive estimations in Microfit allowed for prior elimination of variables that measured the same phenomenon to avoid multicollinearity. This was indicated when the estimation returned the error message: “near singular matrix”. The tolerance test procedure was also applied to detect multicollinearity problem (Yu, 2007). While the tolerance in the case of the long run estimation was low, it was significantly high for the ECM to confirm the absence of any multicollinearity problem. The econometric procedures were carried out using the Microfit and E-Views packages.

The cointegration procedure was carried out using the residual-based approach. Two policy scenarios were examined; one scenario in which policy effects were not existent and another where policy effects were assumed. The no-policy analysis was based on regression of the variables in levels and without including annual dummies, a situation that could have yielded spurious results

due to non-stationarity of the variables. However, since the study made use of real values in all cases, the data has sufficient stability to permit some tentative interpretation which can be a basis for evaluating the subsequent regressions and error correction.

From the results, it was clear that long-run relationships existed between the real farmland prices and the set of explanatory variables included in the model. When the regression assumed the absence of policy effects, negative relationships were established between real farmland prices and real interest on debt, real farm debt, rate of inflation, the exchange rate of the domestic currency, the long-term capital inflows and the land transfer dummy. Under the same assumption, the positive relationships were found to be with real net farm income, short-term capital inflows from abroad, and real GDP per capita. All but the relationship with the real exchange rate of the Rand were statistically significant. However, when six annual dummies were included in the model to reflect policy effects, address the non-stationarity of the variables and deal with serial correlation, it was found that some of the signs changed while the rest remained the same. For instance, the relationships with real interest rate on debt and real farm debt per hectare changed from negative to positive, with the relationship with the farm debt becoming highly significant under the new scenario. Similarly, the relationship with inflation became positive, albeit statistically non-significant, probably because of the strong intervention by government in many aspects of the land market.

An important result is that, regardless of the policy environment, the real GDP per capita maintained a positive and highly significant relationship with real farmland prices, reflecting the importance of this variable in respect to determination of ability to pay within the economy. Another interesting finding is the negative and weakly significant relationship between real farmland prices and the dummy for land transfers, suggesting that the expectation that this can be an effective tool for successful implementation of the land reform is probably misplaced.

Subsequently, an error correction model was fitted to provide insights into the short-run dynamics of the relationships defined by the long-run estimation and correct for deviations in the long-run

estimates. The results could confirm short-run positive relationships between real farmland prices and rate of inflation, real net farm income, real farm debt, and real GDP per capita. In the cases of real net farm income and real farm debt, these positive relationships were statistically significant while they were not for real interest rate on debt, inflation and real GDP per capita. The short-term capital inflows joined the long-term inflows, real exchange rate and land transfers to exhibit a negative relationship with real farmland prices, with weak statistical significance being observed for real exchange rate and long-term capital inflows. While the results with respect to a negative relationship between the short-term capital inflows and real farmland prices may be somewhat surprising when short term capital inflows are employed as proxy for land purchases by foreign investors, it probably lends weight to the notion of a clear segmentation of the South African land market. It has been suggested by those who contend that investment by foreigners does not have any possibility of influencing domestic prices for agricultural land that two land markets exist, one catering to the exotic tastes of foreigners and another catering to more traditional, residential/agricultural needs. In any case, the negative relationship in this case is not statistically significant and therefore not necessarily different from the hypothesized positive relationship which seems to be intuitively more convincing.

In general, the results of the short-run estimation seem to mirror much of the contemporary situation already highlighted and are broadly credible. For instance, the situation with respect to the real net farm income seems to reflect current findings by the Department of Agriculture which has issued statistics that show that real net farm income has been on the decline for sometime while land prices continue to rise. The possibility of the market being awash with liquidity as suggested by the high debt levels is also a situation that one can easily relate to, with the strong likelihood that much of the liquidity results from low savings as a response to low interest rates. In either case, a positive relationship between real interest rate on debt and real farmland prices makes perfect sense. A similar pattern of relationship can be expected between real farm debt and real farmland prices for similar reasons. The resulting residuals had the required negative sign, statistical significance, and absence of serial correlation to justify conclusion of white noise.

CHAPTER 7
SUMMARY AND RECOMMENDATIONS

7.1 Introduction

The study reported in this thesis had the central purpose of modelling the agricultural land prices in South Africa against the backdrop of a plethora of policy and institutional developments in the country. As was pointed out at different instances, the South Africa that is being analyzed today is a completely different one from what prevailed during earlier studies of a similar nature. For instance, after the first-ever democratic elections in the country in 1994, two more have been held and lauded as highly successful. The country is currently enjoying unprecedented stability in the political sphere while the macro-economy continues to grow and strengthen. In the expectation that these developments must have implications for other economic trends and tendencies in the country, this thesis began by providing a broad overview of the dominant developments in the economy, politics, as well as the land market. Then the past researches conducted on the subject of agricultural land prices, both internationally and within South Africa, were extensively reviewed, attention being focused on the methodologies used. The study then went on to conduct empirical assessments and fit the relevant models based on the cointegration theory that allowed for the convenient handling of non-stationary time series data and the establishment of relationships among the variables. The next sections will attempt to summarize the key sections of the thesis.

7.2 Summary

The main body of the thesis is divided into six chapters which covered the introduction and background to the study, the review of the politics, policies and economics of land in South Africa and how it evolved as an important element of the struggle for liberation and a key point in the enthronement of a democratic dispensation in the country. Furthermore, the thesis addressed the subject of previous research conducted on the issue of agricultural land prices in terms of their

trends and assessment methodologies. The thesis then discussed the structure of an appropriate model for analysing the variations in agricultural land prices in the country especially in the current environment featuring land reforms and agricultural restructuring. That same chapter provided a detailed description of the variables introduced in the model. The next chapter presented the statistical properties of the variables and discussed the question of structural breaks in the data. Then the model was fitted in the final chapter. The next several sub-sections will attempt to present the highlights of the issues covered.

7.2.1 Land Issues, Politics and Policies

In the context of the subject-matter of the study, it was important to harmonize our conception of land as a resource and cultural/religious object which evokes a wide range of emotions and policy responses. For these reasons, the discussion looked at land itself as an important object of study and then at the pricing behaviour of this object. The thesis threw more light on the politics, economics, and policy environment of land and its role in the agricultural sector and in a new multifunctional agriculture framework. Since the pricing of land over time is the subject-matter of this thesis, an attempt was made at the outset to throw more light on land as a resource for agricultural production and a myriad other uses.

Recognizing that the South African land question cannot be viewed in isolation, a global as well as a broad disciplinary perspective was adopted to examine the place of land in agriculture and as a productive factor in general. One motivation for this approach was that a land question of the enormity of South Africa's could not have failed to draw from broader global experiences and lessons. The need to contribute to the on-going debate on land ownership and distribution and the whole issue of land tenure systems further informed the review methodology.

The historical context of the South African land question was reviewed from the arrival of the European settlers in 1652. The dispute over whether the arriving white settlers met a thriving agricultural economy and displaced it or found a people completely uninterested in agriculture and

thus introduced a whole new industry remains unresolved. But what followed were a series of violent conflicts between the settlers and the indigenous population beginning from around 1659. The black uprising was quelled as were several others as the settlers moved inland from the coast and conquered more and more territory. As these conflicts continued, gold and diamond were discovered in many parts of the territory and thus was born a novel pattern of labour utilization under which the indigenous male population, now virtually deprived of agricultural land, worked for wages in mines while the female population tended what remained of an indigenous agricultural economy.

The growing affluence of the Dutch settlers on account of their thriving agricultural enterprise became another source of conflict with other settler communities, namely the English who were then beginning to make incursions into the territory. The review showed how the Anglo-Boer War that ensued towards the end of the 19th Century introduced further instability in the region and created the phenomenon of the "poor white" as a result of the deliberate destruction of Dutch settlers' farms by the English soldiers. The review noted the historical fact that every Afrikaner farm the English could not take, they destroyed. In order to keep their farms, some Afrikaner farmers joined the English in their military exercises across the territory.

As these conflicts and their resulting effects on human conditions progressed, a conscious effort was underway to create modern systems of governance embracing the entire territory, culminating in the establishment of the Union of South Africa in 1910. Following that, a series of laws were passed which began more systematically to define the status of the different groups that inhabited the territory. The practice of allocating land to white settlers had already begun and gradually areas of the cities emerged which were settled on strictly racial lines. With the new centralized government, these practices became formalized into a series of legal instruments. The infamous Native Lands Act of 1913 was an outstanding constituent of this body of laws. One important manifestation of this Act was the creation of definite black areas and the introduction of rules about exchange of land and other transactions related to land. As part of this Act, the indigenous black population was forcibly removed from existing settlements to new areas designated "black reserves" which later

transformed into the “independent homelands” and “self-governing territories” well into the later part of the last century.

Over the next half a century, these systems continued to be a source of discontent to the black population whose spokesmen were becoming more and more vocal as education and enlightenment spread and awareness deepened. A change of government in 1948 that put the Afrikaner community in the leadership of the country did little to relieve the growing sense of deprivation among the black population. A series of new laws further entrenched white power and gave rise to a new system of governance known as Apartheid by which the races were to exist and develop separately as a deliberate developmental and economic management strategy. An enduring legacy of the Apartheid Era was a widening of the divide between the white and black races and deepening of black poverty, destitution, and backwardness. Agricultural policy during this era exacerbated the situation by exclusively targeting white farmers with subsidies, technical support and information.

From the mid-1980s, it was obvious that the Agricultural Policy was unsustainable and efforts were made to deregulate the agricultural sector and provide limited empowerment to black farmers within the black settlements and reserves. In many parts of the country, especially the present North West Province and parts of the Free State and Eastern Cape Provinces, this resulted in the settlement of black farmers on land expropriated from white farmers and developed and demarcated by the government. Support was provided on an on-going basis by parastatals specifically created for that purpose. Some recent reviews of those early empowerment programmes suggest that they were largely successful and many of the farmers are still operating today although the discontinuation of state support as part of the new wave of deregulation since 1994 has led to enormous difficulties for the farmers.

Since then, a democratic dispensation in South Africa is pursuing a bold programme of land reform to redress the wrongs of the past and achieve greater equity in the ownership and distribution of land. Three main components of the land reform programme are the land redistribution programme, the land restitution, and tenure reform. The land redistribution programme promises to redistribute

by 2014, a total of 30% of land held by white farmers at the beginning of the reform to black farmers. The land restitution programme is aiming to return land to persons who are able to prove that such land was theirs at the time the Natives Land Act of 1913 went into force. The tenure reform programme is aiming to modernise systems of land ownership and control within the former independent homelands where the systems remain largely traditional and inhibit the emergence of viable agricultural entrepreneurship among the black population. The government is also pursuing a comprehensive programme of agricultural restructuring that aims to integrate the black population, especially small-scale and emerging farmers, into the nation's agricultural economy. In a rather fundamental way, the agricultural policy of the new regime is an attempt to implement the goals espoused in the Reconstruction and Development Programme (RDP) which the ruling party, the African National Congress (ANC), elaborated as a blueprint for governance of the new South Africa upon the dethronement of the Apartheid system.

While all the above are going on, old and long-standing debates are continuing on the question of introducing a land tax in South Africa. The review showed that land tax existed in various forms in pre-Colonial times but it has been difficult to have consensus on a system of land taxation that suits the circumstances of the modern state. Since 2001, a capital gains tax has been introduced by an Act of Parliament, but how this meets the goal of public sector revenue generation, equalization of access to land, stabilization of land prices, etc, are yet to be determined.

7.2.2 Research on Agricultural Land Prices

Since prices form the central theme of the thesis, it was considered necessary to review basic, fundamental definitions that help to set the context for the study and build a common understanding on the subject-matter. The theoretical frameworks underpinning price formation and price determination were reviewed. Specific research conducted in the United States, Europe and elsewhere was taken as background to an examination of the situation in South Africa and some of the important methodological questions associated with research on agricultural land prices. It emerged that researchers have generally looked at four categories of variables in trying to explain

trends in agricultural land prices. These are: measures of government programmes, measures of net return to agriculture, measures of land quality, and measures of financial and/or macro-economic activitiy which also relate to credit market constraints. Emerging issues in respect to the above four measures relate to the observation that more foreign buyers are entering the South African land market since the early 2000s and that this may be distorting the local property market. There is also a perception that reported land prices may actually include elements of collusion among the parties to the transaction specifically arranged to compensate officials for facilitating a transaction in which government is the only loser. The possibilities and difficulties of incorporating these elements in the model were also examined.

Within this context, the review examined models of land price formation employed in other studies and then looked in some detail at the present value model which has been widely used in past studies. Recognizing the inherent non-stationarity of the economic variables, of which prices and the various macro-aggregates identified in the studies are important elements, the review examined the cointegration theory and error correction models to see how they have been applied and how relevant they are in studying the trends in agricultural land prices. As a field of enquiry, research on agricultural land prices has no doubt undergone considerable developments and cointegration analysis has been widely applied with much success although disagreements remain over the kinds of data transformation procedures that are appropriate to achieve stationarity in time series data, the significance of distinctions made between trend and difference stationarity, and measures to establish the validity of tests of stationarity in the face of the inherent fragility of current tests.

7.2.3 The Model Structure

A detailed discussion was presented on the possible variables to be employed in modeling trends in agricultural land prices in South Africa, drawing ample lessons from international experience and local evidence, including the approach adopted in the precursor study by Van Schalkwyk (1995). In order to specify the outline of the model, the thesis recapped the socio-economic settings and policy environment as well as local and international/global political and security developments that

impact on South Africa given its current openness. Against that background, the thesis enumerated the key variables which have emerged from previous scientific research, conferences, seminars, workshops, and a wide range of informal settings that can be broadly classified as "corridor talk" but nonetheless must be taken seriously in the light of their intuitive appeal.

On the basis of the foregoing, the theoretical model for the study was specified within the framework of the present value model which is briefly described. In view of the *a priori* decision to apply the co-integration techniques and error correction mechanism so as to address concerns about the inherent non-stationarity of the relevant economic data and also permit some tentative forecast, the thesis then proceeded to develop the model structure within the co-integration framework. In addition, it was necessary to describe the various tests associated with the application of co-integration techniques and the specialized procedures employed to deal with special cases such as policy instability and structural change.

7.2.4 Model Estimation and Results

The model specified to investigate the trends in agricultural land prices in South Africa was estimated by means of cointegration techniques. The data sets on farm land prices and several other variables used by Van Schalkwyk (1995) were updated to 2003 from 1992 where they originally terminated. Thus, for real farmland price, real net farm income, real interest rates on debt, rate of inflation, and real farm debt per hectare, the series ranged from 1955 to 2003. The new variables introduced in this study are the real GDP per capita, the capital inflows from abroad reflecting the purchase of land by non-South Africans, the real exchange rate of the rand, and a dummy for land transfers to the black population following the initiation of the land reform programme. These data on these variables were also extended to 2003.

The results confirmed what is already well-known in the literature about the inherent instability of economic time series. Mean and variance stabilization were achieved by converting all the nominal values to constant values and by differencing of the resulting series. The estimation procedures

involved the residual-based method of cointegration. The study established cointegrating relationships among the variables and real farmland prices. Having thus confirmed the existence of long-run relationship, the short-run equation was fitted by the error correction mechanism. The evidence from the results suggests that resulting equations fully capture the dynamic relationships in the land market studied, with evidence that most of the deviations from the long-run equilibrium can be compensated for within the same year they occurred.

In particular, positive long-run relationships were evident between real farmland prices and real interest on debt, real net farm incomes, real farm debt, real foreign short-term capital inflows, real GDP per capita, and inflation, with the relationship being highly statistically significant in all but the rate of inflation, real foreign short-term capital inflows, and real interest rate. Interestingly, the study could not confirm that the relationship between the short-term capital inflows was important in the short-run on the basis of the test of statistical significance. This can be an important finding in view of the considerable amount of discussion the perceived role of foreign buyers has generated at various levels of society in recent years. This finding may also confirm that foreign buyers and local South African buyers operate in two different markets and that the one does not influence the other.

7.3 Recommendations

Predictions about the likely direction of farmland price variations are frequently made in South Africa on the basis of experience about how they have characteristically behaved in the past. However, no such prediction has been based on a cointegration analysis of the current policy questions, particularly those related to the on-going land reform process in the country. To that extent, this study contributes to the debate and provides a basis for more sophisticated work in the future. As we have noted in this study, farmland prices are so important that they permeate all aspects of the farm decision-making process and impact on the life and welfare of the farm family to a large extent. As the study has revealed, farmland prices also mirror the overall health of the economy to the extent that some relationship exists between them and the measures of national economic performance such as GDP, interest rates, rate of inflation, etc. Thus, they are important

indicators to watch, not only by the farmer who pays the price or receives the reward, but also by policy makers whose decisions, one way or the other, play an important role in determining where the prices lie.

Government has been understandably concerned about the recent trends. Without a doubt, this concern goes beyond the paternalistic instincts of a government that increasingly aspires to practicalize welfarism as a way of redressing past wrongs. There is clearly a concern over the likely impact of rising prices on the pace of the land reform programme. If the land reform programme was designed as it is within the willing-buyer willing-seller framework that puts a substantial burden on the state to finance land transactions, a sudden escalation of prices will definitely create serious budgetary problems. For a programme that is already being criticized for its slow pace, such a development will not be well-received and has the potential to create uncomfortable stand-offs which the government has struggled quite hard to avoid in the first place, given the ugly situation in neighbouring Zimbabwe.

But the ebb and flow of asset prices only reflect the business cycle and the invisible hand of a free and unfettered market. Therefore, on economic efficiency grounds, the market should be allowed to correct itself without further official interference. But South Africa's situation is undoubtedly a unique one. Unemployment rates are still high and are already being blamed for the high crime rates in the major centres of the country. At the same time, based on expectations concerning the effect of government spending for the hosting of the 2010 World Cup in South Africa, property prices in general, including house prices, are expected to rise further before they can begin to go down. This calls for more than normal economic management procedures to mitigate the negative impacts of such price increases.

On several occasions in 2005, the nation's monetary authorities made a point to continually warn the citizenry about the possibility of interest rates increases. There has been concern over the rising current account deficit estimated to exceed 6% of GDP in late 2006. According to the Governor of the Reserve Bank, such a trend threatens both the Rand and the rate of inflation (The Star, 2006).

Given that both variables (the exchange rate of the Rand and the rate of inflation) bear a positive relationship with real farmland prices, the implications of this development are clear as they hold potential for higher farmland prices over the long-term. In 2005, the Governor of the Reserve Bank said specifically that the "era of low interest rates are over". Since June 2006, the interest rate have been increased by as much as 1.5 per centage points to put the repo rates at some 8.5% per annum (The Star, 2006). This is no doubt one area where some exceptional government action is called for to mildly but unobtrusively influence the trend in the general price level. The impact on overall buying behaviour is likely to be beneficial. There is also a need for government to continue its inflation targeting policy which has been successful overall in maintaining price stability in other sectors.

Evidently, the manifestations of a healthy economy, which are being observed in the country today, cannot be reversed. What seems practical are measures to mitigate their impact on small and emerging farmers and ensure that they are able to operate within this dynamic agricultural and broader economic environment with minimum hardships. The Government programme to enhance Black Economic Empowerment in Agriculture (AgriBEE) includes a number of strategies and options that can be considered to deal with the rising farmland prices and ensure that its harsh realities are mitigated. These shall be examined in turn.

7.3.1 Transferring Available State Land to Emerging Farmers

A proposition that puts the responsibility squarely in the laps of the government concerns the issue of the use of state lands. While the logic of withdrawing some of this land from private use is not questionable, the current situation calls for a re-think. For instance, the results of the estimates carried out in this study have clearly demonstrated that the price issue can also be a matter of demand and supply even if a lot of non-market factors are at play. There is very little available land while there are many people who desperately would wish to own land and invest in agriculture, particularly in the face of the generous cash grants and other incentives being provided by government. In the light of this, it seems contradictory that a large part of potential productive land

is idle while the majority literally break their heads on a limited supply of the land. Some commentators who have followed the process over time are of the opinion that releasing some of the state land into the redistributable pool (Van Zyl and Binswanger, 1996) can ease the pressure on the market and possibly stabilize the farmland prices. Van Zyl and Binswanger (1996) have also proposed a land redistribution model which incorporates debt relief for highly indebted farms. Under this model, the government settles the creditor bank to release the debt-burdened farmer from indebtedness and then transfers the land to black farmers. Since the land transfer does not entail the usual competitive pricing process associated with buying and selling of land in the open land market, it has the advantage of not being inflationary and may therefore tend to stabilize farmland prices.

Of the 101 million ha of agricultural land in the country, an estimated 23.9 million ha are designated state land which makes up about 19.8% of the total national surface area (DLA, 2004). Under the AgriBEE Framework, Government is favorably disposed to considering the redistribution of state land to emerging farmers to enhance their access to land for agricultural purposes (DoA, 2004; DLA, 2004;, Swanepoel et al, 2004). The argument is that some of the state land is being used for non-agricultural purposes and their redistribution can be a means of settling small farmers more quickly than existing procedures. But the challenge may be agreeing on an optimal basis for selection of the beneficiaries to ensure that only farmers who are unable to access land through the regular channel are accommodated under the new arrangement.

7.3.2 Joint Ventures, Equity Schemes, Multiple Ownership.

The Framework document on Black Empowerment in Agriculture has attempted to minimize the importance of land in agricultural production. This is perhaps one way the impact of prices on the small-scale farmer can be reduced. A small-scale farmer who does not have enough capital to acquire land and set up farm structures can simply buy into on-going enterprises through joint ventures, equity schemes, and multiple ownership. According to the document, land ownership is different from enterprise ownership (DoA, 2004). It is therefore the expectation of the Department

of Agriculture that alternative models of enterprise ownership would be developed to support the broad-based black economic empowerment (AgriBEE).

The February 2004 evaluation of empowerment policies, strategies and performance within the agricultural sector sees this approach as a way of expediting the settlement of black farmers and improving their welfare (Swanepoel *et al.,* 2004). The evaluation also sees this approach as a fast track mechanism to overcome the constraints imposed by high agricultural land prices as well as serving as an instrument for skills transfer since the founding farmer would normally be a highly knowledgeable farmer. However, the evaluation detected some residual element of mistrust between the black and white populations which might work against the establishment or smooth running of such concerns. Clearly, a lot of work is required on this aspect of South African life to achieve full reconciliation and mutual acceptance among the various races that make up this "Rainbow Nation".

7.3.3 Lease holding

The above option does not mean that outright ownership of agricultural land by small-scale and emerging farmers is not encouraged. Far from that, the Framework document reiterates the intended RDP goal of transferring 30% of the nation's agricultural land to black ownership. In addition to this, the Framework document encourages the established commercial farmers to contribute to the process by leasing up to 20% of their high potential land to black farmers. These efforts are to be supported by Government through existing mechanisms and new innovative ways for funding such as those described under the Comprehensive Agricultural Support Programme (CASP). It is expected that this process will reduce the pressure on the land market and possibly minimize the rate of increase of agricultural land prices.

7.4 Recommendations for Further Research

Nothwithstanding the sizeable number of variables included in the model, this study has focused on only a limited range of factors influencing farmland prices and it can therefore not claim to have

captured enough evidence to pronounce on such a complex subject. It is therefore necessary to conduct further investigations into the determinants of farmland prices and also examine how they relate to the trends in house prices despite international evidence that these two categories of prices are positively related. Again, the cointegration analysis employed in this study only specified short-run dynamics in the single-equation case and not in the multivariate case. Although the literature on VAR modeling was reviewed, this study did not use that approach in fitting the model. It will be necessary to examine the behaviour of the variables within a vector error correction mechanism (VECM). More specifically, it will be useful and quite informative to research into the following aspects:

a) **The relationship between movements in farmland prices and house prices:** Housing represents an important use of land and with increased income and urbanization, more land is required for residential purposes. This is likely to impact on the availability of land for agricultural purposes and through the interaction of demand and supply, influence the level of prices for land for agriculture. The nature of such a relationship is of both academic and policy interest and needs to be well understood.

b) **Effects of foreign buyers on the level of farmland prices in South Africa:** In the present study, an indirect measure of foreign investment in the property market has been used. While the private non-banking short term foreign liabilities meets the definition of the category of capital inflows that go into such investments, it is imprecise because it also includes aspects that go elsewhere. To this extent, it is not likely to capture the full range of causal relationships between this phenomenon and farmland prices. It is therefore recommended that a more focused study be conducted using fewer variables but specifically measuring actual spending by foreigners in buying agricultural land. The study should also investigate the nature of the property that foreigners do buy to test the assumption that foreigners and locals operate in different segments of the market, with foreigners going for the more exotic while locals go for the more conventional uses of land. Government policy on the extent of foreign ownership of agricultural land that is permitted in South Africa will

be hugely influenced by the findings of such a study and remove the element of arbitrariness that may already be suspected in current actions on the matter.

c) **Comparing Differences in Farmland Price Trends Between Provinces and Agro-ecological Zones of the Country:** Such a study will eliminate possible aggregation problems in the present study. It will be useful to demonstrate that the country is not a homogenous agricultural entity and that important differences may in fact exist among areas specializing in the production of maize, wheat, beef, sheep, horticulture, etc. Since the macroeconomic and other factors will differ from one product to the other, it is highly probable that their effects on farmland prices in these different areas will also be different. It is also true that land claims and other components of the on-going land reform programme differ according to the land use patterns. To this extent as well, the impacts of foreign inflows will differ from one region of the country to the other.

d) **Impact of Farmland Prices on Debt Accumulation in South Africa's Agricultural Sector:** Given the importance of farm debt in commercial agriculture such as the one that has given South Africa its dominant food security position, it is important to see to what extent the trend in prices is influencing the debt level and ultimately the scope for the maintenance of food security at current and projected levels, taking account of the new entrants into the business. How the current and projected levels of interest rates influence the level of farm debt should be of interest for researchers and policy makers alike.

e) **Impact of Land Reform on Farmland Prices:** Up to this time, statements about the impact of the land reform programme on farmland prices have been largely hypothetical and tentative as no conclusive ex poste study has explicitly examined the relevant relationships and patterns of causation. Now that the land reform programme has been going on for more than a decade, a reasonable amount of data should be available to form the basis for an evaluation of its impact on farmland prices. A number of the strategies being implemented under the scheme, including cash grants and payments by government for land restoration,

as well as the initiatives included under the CASP package, are expected to influence economic activity one way or another. To what extent they also affect the level of farmland prices should be interesting to policy makers since the pace of the land reform programme on which its success crucially depends, may indirectly be affected by the price paid for the land. This is particularly important as the major burden for financing the reform programme rests on the government which has to consider other conflicting demands on its resources.

f) **Impact of Quality Changes on Farmland Prices:** Since overtime farmland experiences quality changes due to simultaneous investments in land improvements and deterioration due to soil erosion and other man-made phenomenon, it will be useful to investigate the effects these would have on farmland prices in the long run. The methodologies for assessing quality differences and calculating quality indices in both the commercial and communal sectors can be developed and refined under such a study in addition to its important outcomes in providing more policy-relevant information on land price trends.

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APPENDIX

Appendix 1: Consumer Price Index (CPI) Series at 2000=100
Appendix 2: Data for modelling
Appendix 3: Key to Data Labels

APPENDIX 1: CONSUMER PRICE INDEX (CPI) SERIES AT 2000=100

YEAR	CPI 2000=100	CPI 1985=100	CPI 1995=100
1955	2.7	12.8	
1956	2.7	13.1	
1957	2.8	13.5	
1958	2.9	13.9	
1959	2.9	14.1	
1960	3	14.3	
1961	3	14.6	
1962	3.1	14.8	
1963	3.1	15	
1964	3.2	15.3	
1965	3.3	15.9	4.6
1966	3.4	16.5	4.7
1967	3.5	17	4.9
1968	3.6	17.3	5.0
1969	3.7	17.8	5.1
1970	3.9	18.7	5.4
1971	4.1	19.9	5.7
1972	4.4	21.2	6.1
1973	4.8	23.2	6.7
1974	5.4	25.9	7.5
1975	6.1	29.4	8.5
1976	6.8	32.7	9.4
1977	7.6	36.3	10.5
1978	8.4	40.3	11.6
1979	9.5	45.6	13.1
1980	10.8	51.9	14.9
1981	12.5	59.8	17.2
1982	14.3	68.6	19.7
1983	16.1	77.1	22.2
1984	17.9	86	24.7
1985	20.8	100	28.8
1986	24.7	118.6	34.1
1987	28.7	137.7	39.6
1988	32.4	155.4	44.7
1989	37.1	178.2	51.3
1990	42.4	203.8	58.6
1991	49	235	67.6
1992	55.7	267.6	77.0
1993	61.2	294.2	84.5
1994	66.6	320.2	92.0

YEAR	CPI 2000=100	CPI 1985=100	CPI 1995=100
1995	72.4	348.1	100.0
1996	77.7	373.6	107.4
1997	84.4	405.8	116.6
1998	90.2	433.7	124.6
1999	94.9	456.3	131.1
2000	100	480.8	138.1
2001	105.7		145.9
2002	115.4		159.3
2003	122.1		168.5

APPENDIX 2: DATA SET FOR MODELLING

YEAR	NLPPH	RLPH	NFDBT	RFDBT	RFDPH	NNFI	RNFI	RFBSPH	INFL	RINTD	CGDP	RFBLPH	GDPPC	REER	LNDTR	RSAUS	RINTRD
1955	32.82	1215.45	475.60	17614.81	201.38	3.29	121.99	910.00	0.02	0.06	0.00	54.29	14755.19	0.00	0.00	1322.59	0.049316
1956	31.94	1182.90	484.00	17925.93	203.71	3.61	133.71	913.33	0.02	0.06	3.00	54.29	15198.43	0.00	0.00	1322.59	0.041626
1957	33.60	1200.09	520.40	18585.71	211.43	3.14	112.22	853.18	0.03	0.06	1.97	53.63	15497.79	0.00	0.00	1275.36	0.034449
1958	34.18	1178.71	529.20	18248.28	205.40	2.40	82.61	974.20	0.03	0.07	0.29	50.84	15542.53	0.00	0.00	1231.38	0.036325
1959	35.61	1227.87	592.80	20441.38	220.14	2.63	90.77	969.25	0.01	0.07	2.04	48.65	15860.06	0.00	0.00	1231.38	0.051853
1960	37.41	1247.13	610.00	20333.33	221.53	2.70	89.96	918.79	0.01	0.07	0.49	41.76	15938.38	0.00	0.00	1190.33	0.054033
1961	37.81	1260.35	600.80	20026.67	220.66	3.32	110.59	976.96	0.02	0.07	1.13	31.22	16118.97	0.00	0.00	2381.00	0.05191
1962	41.22	1329.81	613.00	19774.19	218.60	3.56	114.91	945.00	0.01	0.07	3.37	27.10	16662.10	0.00	0.00	2304.19	0.05258
1963	43.39	1399.69	642.50	20725.81	231.53	4.07	131.44	1048.65	0.01	0.07	4.53	23.06	17416.54	0.00	0.00	2304.19	0.052787
1964	53.39	1668.37	752.60	23518.75	257.43	3.59	112.19	1005.64	0.02	0.07	5.02	22.58	18290.95	0.00	0.00	2232.19	0.05
1965	59.37	1799.17	819.70	24839.39	282.92	3.63	110.00	1111.40	0.04	0.07	3.23	29.34	18881.06	0.00	0.00	2164.55	0.031563
1966	59.97	1763.69	830.20	24417.65	280.66	4.96	145.96	1233.94	0.04	0.07	1.57	41.92	19177.75	0.00	0.00	2100.88	0.036909
1967	73.87	2110.64	1031.80	29480.00	341.34	7.38	210.75	1243.88	0.03	0.08	4.29	43.67	19999.90	0.00	0.00	2040.86	0.046297
1968	79.58	2210.55	1124.40	31233.33	355.26	5.98	166.04	1513.41	0.02	0.07	1.37	62.24	20273.71	0.00	0.00	1984.17	0.05739
1969	80.77	2182.94	1260.60	34070.27	382.23	5.73	154.93	1625.23	0.03	0.07	1.90	65.80	20659.25	0.00	0.00	1930.54	0.045777
1970	81.92	2100.43	1402.00	35948.72	402.97	5.47	140.38	2017.71	0.05	0.07	2.46	75.02	21167.03	0.00	0.00	1831.54	0.02608
1971	90.55	2208.44	1460.70	35626.83	398.97	6.61	161.16	1999.33	0.06	0.07	1.74	102.15	21534.44	0.15	0.00	1742.20	0.013907
1972	99.38	2258.61	1516.20	34459.09	392.41	9.35	212.41	2042.00	0.07	0.07	-0.79	114.65	21364.78	-9.11	0.00	1847.73	0.011922
1973	109.67	2284.85	1724.70	35931.25	408.70	13.17	274.46	1715.65	0.09	0.07	2.09	125.12	21810.55	4.90	0.00	1640.42	-0.01581
1974	133.99	2481.35	1785.50	33064.81	383.78	16.07	297.50	2538.49	0.12	0.08	3.68	128.32	22612.96	2.31	0.00	1322.78	-0.02544
1975	153.19	2511.27	2003.60	32845.90	384.14	14.51	237.82	2831.81	0.09	0.08	-0.58	133.63	22480.85	0.50	0.00	1425.57	0.001835
1976	172.28	2533.56	2297.60	33788.24	394.17	19.18	281.99	2696.91	0.12	0.09	-0.06	124.55	22467.25	-1.50	0.00	1278.82	-0.01878
1977	199.75	2628.29	2607.00	34302.63	400.73	17.11	225.12	2591.61	0.12	0.09	-2.45	139.57	21916.86	4.86	0.00	1144.21	-0.01878
1978	216.14	2573.12	2870.10	34167.86	399.87	18.28	217.63	2925.79	0.11	0.09	0.54	137.65	22035.73	-5.00	0.00	1035.24	-0.00905
1979	239.14	2517.30	3218.30	33876.84	395.30	24.50	257.90	2219.49	0.13	0.08	1.42	104.77	22348.65	5.22	0.00	886.32	-0.03802
1980	249.51	2310.24	3838.60	35542.59	413.29	22.73	210.44	1776.49	0.14	0.08	4.23	89.04	23293.95	11.84	0.00	721.11	-0.04134
1981	254.86	2038.91	4838.70	38709.60	448.72	32.58	260.60	2106.95	0.16	0.11	2.91	79.66	23972.50	8.20	0.00	702.00	-0.02939
1982	289.91	2027.32	5785.50	40458.04	469.90	19.83	138.65	2625.02	0.14	0.13	-2.66	87.64	23335.24	-3.87	0.00	759.37	-0.00087
1983	323.56	2009.69	7408.90	46018.01	534.93	14.27	88.63	2604.27	0.13	0.13	-4.06	84.84	22387.47	11.82	0.00	691.99	0.01865
1984	344.09	1922.29	9495.30	53046.37	616.10	27.49	153.57	4049.47	0.11	0.16	2.76	114.46	23006.45	-13.15	0.00	824.41	0.06295
1985	343.88	1653.28	11117.60	53450.00	620.44	27.87	133.99	3302.08	0.16	0.12	-3.37	118.59	22231.82	-21.84	0.00	1071.11	-0.01549
1986	405.46	1641.52	12770.30	51701.62	602.04	53.45	216.40	2237.92	0.19	0.11	-2.15	80.43	21753.63	-3.74	0.00	924.49	-0.05219
1987	462.33	1610.91	12880.30	44879.09	523.10	68.93	240.18	1592.00	0.16	0.12	-0.06	72.45	21739.72	12.07	0.00	709.30	-0.02151

YEAR	NLPPH	RLPH	NFDBT	RFDBT	RFDPH	NNFI	RNFI	RFBSPH	INFL	NINTD	CGDP	RFBLPH	GDPPC	REER	LNDTR	RSAUS	RINTRD
1988	517.65	1597.69	13512.30	41704.63	486.25	72.05	222.39	1253.74	0.13	0.15	2.04	43.15	22182.51	-3.99	0.00	701.42	0.032772
1989	559.45	1507.95	15080.40	40647.98	483.90	87.83	236.75	853.23	0.15	0.16	0.26	40.66	22240.54	2.08	0.00	706.79	0.034934
1990	583.54	1376.28	15682.50	36987.03	446.25	68.01	160.41	649.34	0.14	0.16	-2.39	43.19	21710.09	2.08	0.00	610.31	0.03762
1991	585.56	1195.02	16489.00	33651.02	407.69	91.00	185.71	687.35	0.16	0.16	-3.06	46.71	21044.86	4.17	0.00	563.45	0.021626
1992	563.73	1012.09	17196.70	30873.79	374.04	65.09	116.86	572.92	0.14	0.15	-4.16	46.72	20169.60	1.78	0.00	511.96	0.034301
1993	498.50	814.54	18286.90	29880.56	362.01	106.56	174.11	602.99	0.10	0.14	-0.86	70.14	19995.66	-1.28	0.00	533.77	0.053685
1994	532.27	799.21	18183.70	27302.85	330.78	115.87	173.97	806.77	0.09	0.15	1.09	93.54	20214.46	-1.99	0.00	532.99	0.068934
1995	568.92	785.80	19396.00	26790.06	324.57	126.75	175.07	901.95	0.09	0.17	0.98	103.01	20411.64	-1.48	1.00	500.97	0.085557
1996	588.26	757.09	20249.50	26061.13	315.74	137.32	176.73	919.79	0.07	0.18	2.14	100.60	20848.20	-6.21	1.00	552.95	0.116496
1997	595.32	705.35	22550.30	26718.36	323.70	151.27	179.23	1106.44	0.09	0.18	0.51	105.62	20955.48	6.58	1.00	545.89	0.098527
1998	623.91	691.70	24750.60	27439.69	332.44	163.76	181.56	899.51	0.07	0.21	-1.58	140.48	20625.41	-9.37	1.00	613.26	0.144995
1999	623.94	657.47	27728.30	29218.44	353.99	174.59	183.97	884.96	0.05	0.18	0.24	171.46	20675.35	-6.58	1.00	644.16	0.128327
2000	623.70	623.70	29825.90	29825.90	361.35	185.89	185.89	894.95	0.05	0.14	2.07	200.48	21103.96	-0.93	2.00	693.53	0.086338
2001	954.35	902.88	30826.40	29164.05	353.33	213.46	201.95	1445.57	0.06	0.13	0.78	258.97	21268.61	-8.61	2.00	813.92	0.072848
2002	1274.39	1104.33	28231.60	24464.12	296.39	248.01	214.91	961.34	0.09	0.14	1.87	233.81	21667.22	-9.67	2.00	911.31	0.057692
2003	1517.44	1242.79	30896.70	25304.42	306.57	182.01	149.07	996.20	0.06	0.13	1.37	223.92	21964.32	25.06	2.00	619.55	0.071834

APPENDIX 3: KEY TO DATA LABELS

NLPPH	Nominal Land Prices Per Hectare
RLPH	Real Land Prices Per Hectare
NFDBT	Nominal Farm Debt
RFDBT	Real Farm Debt
RFDPH	Real Farm Debt Per Hectare
NNFI	Nominal Net Farm Income Per Hectare
RNFI	Real Net Farm Income Per Hectare
RFBSPH	Real Foreign Buyers (Short-Term) Per Hectare
INFL	Rate of Inflation
NINTD	Nominal Interest Rate
CGDP	Per Cent Change in GDP
RFBLPH	Real Foreign Buyers (Long-Term) Per Hectare
GDPPC	Gross Domestic Product Per Capita
REER	Real Effective Exchange Rate
LNDTR	Land Transfer Dummy
RSAUS	Real Exchange Rate of Rand to the US Dollar
RINTRD	Real Interest Rate on Debt