Abstract

Exports have considerable effects on economic growth, employment and trade so it is crucial to understand the factors that are responsible for their variation. This study analyses the fundamental determinants of exports using annual South African data covering the period 1980 to 2006. It initially provides an overview of the South African export structure and export growth. A review of theoretical determinants is then specified. The study tests for stationarity and cointegration using the Johansen (1991, 1995) methodology. A vector error correction model is run to provide robust determinant variables on exports**.** The following variables which have been found to have a long run relationship with exports include: the domestic price of exports, real effective exchange rate, trade openness, foreign income and price of inputs (cost of production). The estimate of the speed of adjustment coefficient found in this study indicates that about 96% of the variation in exports from its equilibrium level is corrected within one year. The results that have emerged from this analysis corroborate the theoretical predictions and are also supported by previous researchers or studies.

Keywords: Determinants, growth, exports, South Africa.

Declaration and Copyright

I, the undersigned, **Ireen Choga,** student number **200302655,** do hereby declare that this dissertation is my original work with the exception of quotations and references whose sources are acknowledged and that it has not been submitted, and will not be presented at another University for similar or any other degree award.

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Signature

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Date

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Dedication

This dissertation is dedicated to my beloved parents Mr. T. and Mrs. R. Choga, who encouraged me to further my studies.

List of acronyms and abbreviations

ADF: Augmented Dickey Fuller

AGOA: Africa Growth and Opportunity Act

BOP: Balance of Payment

BTI: Board of Tariffs and Trade

CIA: Central Intelligence Agency

CPI: Consumer Price Index

CSSB: Chinese State Statistic Bureau

DTI: Department of Trade and Industry

DTNICPRC: Data of the Third National Industrial Census of the People's Republic of China

EA: East Asia

ECM: Error Correction Model

EEC: European Economic Community

EIU: Economist Intelligence

EMA: Export Marketing Assistance Scheme

EU: European Union

FDI: Foreign Direct Investment

FTA: Free Trade Agreement

FTP: Free Trade Protocol

GATT: General Agreement on Trade and Tariffs

GDP: Gross Domestic Product

GEAR: Growth, Employment and Redistribution

GEIS: General Export Incentive Scheme

GETS: General to Specific

GSP: Generalised System of Preferences

GUM: General Unrestricted Model

HOV: Heckcher-Ohlin-Vanek

ICBS: Indonesia Central Bureau of Statistics

IDC: Industrial Development Corporation

IFS: International Financial Statistics

IMF: International Monetary Fund

IMF: International Monetary Funds

LM: Langrage Multiplier

MIDP: Motor Industry Development Programme

MNC: Multi- National Corporation

NAFTA: North Atlantic Free Trade Agreement

NIS: National Institute of Statistics

NP: National party

OAU: The Organisation of African Unity

OLS: Ordinary Least Square

OPEC: Organisation of Petroleum Exporting Countries

PCT: Product Cycle Theory

QRs: Quantitative Restrictions

R&D: Research and Development

RE: Random Effects

REER: Real Effective Exchange Rate

SACU: Southern Africa Customs Union

SADC: Southern African Development Community

SARS: South Africa Revenue Services

TDCA: Development and Cooperation Agreement

TSLS: Two Stage Least Square

TVE: Township Village Enterprise

UK: United Kingdom

US: United States

VAR: Vector-Auto-Regression

VEC: Vector Error Correction

VECM: Vector Error Correction Model

WTO: World Trade Organisation

Table of contents

List of Tables

Appendix Table

List of Figures

Chapter one

Introduction

1.1 Background of the study

International trade has long been a subject of great interest to researchers ever since nations came into being, that is, when national borders were established. International trade is an essential element in broadening the prospects for economic expansion in all countries and it has for a long time been hailed as an engine of growth. It has been widely accepted that nations mutually benefit from trade. The impact of international trade and economic growth can be analysed in a number of ways. For instance, international trade promotes domestic efficiency in production, specialisation and international competitiveness which leads to high global output and growth of gross domestic product (GDP).

Globalisation of the economy has added many challenges for businesses around the world. Hence, the success of a country depends on its ability to do business in an efficient way in a dynamic global economy. The issues of competitiveness and comparative advantage have become very important. Economic theory predicts that all countries gain if they specialise and trade the goods in which they have a comparative advantage. In many African countries, lack of sufficient manufactured exports is often seen as a major reason for the continent's lack of industrialisation resulting in dismal growth (Oostendrop, Naude and Serumaga, 2002). South Africa is the most industrialised country on the African continent with manufacturing output contributing to approximately 25% of its GDP. The country has a comparative advantage in capital-intensive products.

South Africa is best known for its precious metals. It holds the world's largest reserves of gold (35%); platinum group metal (55.7%), manganese ore (80%), chrome ore (68.3%) and it also produces a large share of the world's diamonds. In addition, the country is also known for its agricultural products like fruits and wine (Investment Sectors, 2000).

South Africa's foreign trade and investment was affected by sanctions and boycotts especially during the 1980s and early 1990s. These measures included an oil embargo first instituted by oil producing and exporting countries (OPEC) in 1979, a 1983 prohibition on International Monetary Funds (IMF) loans; a 1985 cutoff of most foreign loans by private banks; the US 1986 comprehensive Antiapartheid Act; and the 1986 European Economic Community (EEC) ban on trade and investment. The Organisation of African Unity (OAU) also discouraged trade with South Africa (World fact book, 1996). Throughout this period, South Africa's economy depended heavily on foreign trade even though it was under pressure from international sanctions and recessions. In the early 1980s, the mining sector exports accounted for between 60% and 65% of total exports (Edwards and Alves, 2006). Gold dominated the country's exports during this period.

In 1994, the new democratically elected government inherited an economic system which was characterised by declining economic growth (Edwards *et al.*, 2006). In response to these pressures, the South African government adopted a number of policies and programmes to restructure the economy in order to make it a globally competitive nation able to confront the rapid changes in the world.

The outward looking trade policy adopted by South Africa since the early 1990s has ensured that exports growth played a critical role in the government's Growth, Employment and Redistribution (GEAR) strategy (Naude, 2000, Bahad and Amusa, 2003 pg. 2). GEAR was aimed at promoting policies that support free market activities in order to strengthen South Africa's external competitiveness and foster long term economic growth. South Africa also joined the Southern African Development Community (SADC) in 1994. The main purpose of SADC was regional re-integration. In addition, the country acceded to the World Trade Organisation (WTO) and negotiated a Free Trade Agreement (FTA) with the European Union (EU) in 1999. This was meant to increase access to the strategic markets (Locomotive for Africa growth, 2002). Improved access to markets stimulated exports. The reintegration of South Africa into the world economy since 1994 led to rapid increases in exports to various regions. The Department of Trade and Industry (DTI) in South Africa promoted the formation of industry-based export councils to assist exporters in reaching their targets.

The government introduced supply-side measures such as the export credit guarantees and an export marketing assistance scheme to stimulate exports. The South African trade policy exerted a major influence on the composition and aggregate growth of trade. The new trade policy aimed at improving and expanding exports, with manufacturing exports in particular. Thus, the country has evolved from agriculture and mining dominated economy to a manufacturing and service based economy (Estherhuizen and Johan, 2006).

The shift in export patterns is clearly shown by statistics for the post 1994 period. Statistics showed that gold exports as a percentage of the total exports declined from 22% in 1996 to 14% in 2000. Moreover, annual export growth of manufactured goods increased from 20% in 1996 to 24% in 2000. Thus, high export growth was experienced in relatively skill-intensive sectors such as coke, refined petroleum products, chemicals, motor vehicles, parts and accessories and transport equipment (Erwin, 2000).

Several researchers have pointed out the importance of exports and export growth in the economy and why it is important to understand the exports' fundamental determinants (see for example Sangita, 2000, Bleaney and Wakelin, 2000, Cheng and Changqi, 1999 and Grenier, McKay and Morrissey 1998). There are very few studies that have looked at this relationship in South Africa, for example Edwards and Alves (2005) and Gouws (2005) but they did not pay attention to the growth of exports in South Africa which calls for a fresh analysis of this relationship. In addition, this study employs more recent econometric techniques, whose application is still in its infancy in South Africa.

1.2 Statement of the problem

Exports play a vital role in foreign trade and economic development. It is apparent that changes in export levels have wider and far reaching economic effects. It is very important that we understand the factors determining the volume of exports as well as those that underpin the growth of exports in South Africa. The primary objectives of any country are to maintain an adequate level of foreign reserves and to create and maintain a sustainable,

internationally competitive exporting sector that will contribute to job creation and high incomes. In addition, the country must also have the capability to deliver the products to the foreign market. In short, the nation must be able to do business in a dynamic global environment. The increase of exports in a country will stimulate domestic production and employment thus, exports contributes to an improvement in a nation's welfare.

Exports are particularly important for developing economies where traded goods sectors are an important share of gross domestic product hence little research has been done on factors determining exports in South Africa. Therefore, in this case, this study seeks to identify factors determining exports and how they can be administered to promote exports growth. South African exports have fluctuated considerably over the years depending on the prevailing trade policies and exchange rate. Such concerns warrant an examination of the determinants of exports in South Africa. Since real export is a crucial variable in the economy, it is necessary to understand the factors determining this variable so as to manage it better and to place the South African economy on a path of growth and sustainable development.

1.3 Significance of the study

The study will be a valuable source of information for policy makers in international trade as they need such information in formulating policies. Policy makers need information on the precise factors that affect exports in all countries. Therefore, by explaining the determinants and behaviour of exports in the South Africa context, this study will help policy makers to design potent policies. In addition, this study will act as a good source of information for researchers, as the results will inform debates on this subject. This research will also contribute to empirical literature on the factors that drive exports growth in South Africa. Every economy of the world strives to be internationally competitive so as to improve economic growth and people's welfare.

At the international level, this study will contribute to the ongoing debate on globalisation, integration and the impact of trade liberalisation on developing countries. This is very

significant especially now when plans are underway to integrate the SADC into one free trade zone by 2008. The knowledge of the behaviour of exports will be invaluable in developing a favourable and sustainable trade policy that will benefit rather than hurt South African industry and commerce.

What also makes this study worthwhile pursuing is the issue of export growth. The 2002 Budget Speech reported that export diversification continued in non-traditional manufactured goods, tourism related trade, and growth in services exports. Manufactured exports grew from 9% to 20% of GDP between 1990 and 2000. Export growth in completely new export sectors may generate positive externalities on the rest of the economy as export oriented sectors gain from dynamic learning activities due to contracts to foreign purchases and exposure to international competition. Export growth is positively correlated with economic growth. The opportunity to expand exports is a key determinant of the prospects for economic growth in developing countries like South Africa.

Exports often provide scarce foreign exchange, scope for economies of scale and stimulate productivity growth as developing countries seek to compete in international markets. Higher export volume increases South Africa's foreign exchange reserves and thus mitigates the hold of what is described as the " iron law of the balance of payments"(Naude, 2000). The knowledge of exports is crucial because it is the creator of employment and it affects the growth and development of the South African economy in general.

Since exports are a key part of international trade and development, the export of capital goods in particular is therefore vital to economic growth. This is imperative in developing countries like South Africa where exports constitute the motor of economic expansion. Therefore, this study seeks to explore the subject matter of exports, particularly what drives them, thereby contributing to available empirical literature on the debate in South Africa.

1.4 Objectives of the study

The main objective of this study is to investigate the fundamental determinants of exports in South Africa. This broad objective is explored through the following sub-objectives:

- To identify the long run fundamental determinants of exports.
- To determine the significance of factors such as exchange rate, real foreign income and the relative prices of exports affecting exports in South Africa.

1.5 Hypothesis of the study

The running hypothesis of this study is that real exchange rate, real foreign income, and domestic prices of exports are the major significant determinants of South African exports. In other words, the hypothesis is that the above mentioned factors directly and strongly influence the level of exports in South Africa.

1.6 Proposed organisation of the study

The study is divided into six chapters. Following this introductory chapter, chapter 2 gives an overview of the South African trade sector with reference to exports. In addition, the chapter will review South African trade policy and identify historic trends and extract determinants of exports that are applicable to South Africa. Chapter 3 provides an overview of both theoretical and empirical literature on the determinants and growth of South African exports. Theoretical literature consists of the theories that underpin trade and the current implications of these theories to South Africa. Methodologies to be employed are expounded in chapter 4. This involves model specification and an explanation of the techniques to be used. Chapter 5 deals with empirical analysis of findings and results. Summary of the study, findings, conclusions, policy recommendations, limitations and areas for further research are discussed in chapter 6.

Chapter two

An overview of the South African exports

2.1 Introduction

South Africa is a middle income, developing country which is richly endowed with mineral resources such as gold and platinum. These form a significant portion of its export base. Thus, natural features and endowments contribute to what a country can export. Besides being well endowed in vast amounts of resources, South Africa's manufactured export growth since 1994 has been rapid. The country has initiated a rigorous export policy aimed at reducing dependence on mineral export revenues and boosting the manufactured export sector.

The ways in which export patterns change over time have profound implications on the relationship between trade on one hand, and industrialisation and economic growth on the other hand. This chapter therefore, presents a comparative analysis of South Africa's export structure since 1980. Many factors determine trade patterns in South Africa. To gain a better understanding of the factors affecting trade in South Africa it is logical to distinguish trade into two periods, namely the apartheid era and the post apartheid period. Such a distinction is relevant since events that occurred in each era were distinct with different policies and outcomes. Although the country experienced boycotts and sanctions during this apartheid era, South Africa realised the need for export promotion policies. This chapter is crucial in determining and analysing factors that affect exports and growth in the manufactured exports in South Africa.

2.2 A Summary of the historical overview

After the institution of apartheid in 1948, political and economic sanctions were imposed against South Africa. Among the trade related pressures to which South Africa has been subjected, three are of particular importance: the embargo on sales of arms and ammunition, the oil embargo imposed by the Organisation of Petroleum Exporting Countries (OPEC), and

the range of partial trade sanctions adopted in recent years by the United States, the Commonwealth of Nations and the European Communities.

In response to the outrages of apartheid, a significant amount of foreign investment was withdrawn from South Africa. The economy was going through a serious recession after the adoption of sanctions and also the country experienced economic difficulties. The sanctions and debt crises led to a decline in investment and a need to accelerate export growth. The imposition of sanctions effectively froze South African corporates from trading with the world, while global Multi National Corporations (MNCs) were barred from trading with South Africa. Although it is difficult to quantify the impact that sanctions had on the South African economy, they certainly did influence the direction, volume and price of trade.

2.2.1 South African trade regime 1980-1989

The South Africa export base has been influenced by trade reform which has undergone several changes since 1980, the main aim being to be more internationally competitive and to diversify exports into non- gold items. There was a lack of policy in relation to trade reform in the 1980s due to international pressures such as sanctions and recession. South Africa's trade regime in the 1980s was characterised by excessive protection built around high tariffs, formula duties, import surcharges and direct control. South Africa's trade policy was historically guided by three principles. The first was the import-substituting industrialisation which protected infant industries. The second was the development of strategic industries in coal, oil and arms as international opprobrium and isolation towards South Africa increased as a result of the policy of Apartheid. The third was the deliberate development of mineral related exports through upstream mineral beneficiation policy adding value to South's mineral natural resources products through further processing (Tsikata, 1999).

Apartheid also contributed to lower productivity. During this era, the export basket was small, gold in particular and primary products or lightly processed primary products dominated South Africa. Gold exports alone contributed close to 40% of the country's total exports earnings, other minerals such as coal and diamonds also contributed 20% to total

exports. In response to the perception that growth through import substitution was being exhausted and in the wake of declining manufacturing production and trade, attempts were made to mitigate the anti-export bias of the system. The export incentives were introduced to compensate for the anti-export bias implicit in the import restrictions.

By the mid1980s, a full range of incentives were in place, including direct cash grants, tax concessions on turnover and on profits from exports, rebates and drawback of customs duties on imported inputs, and rail freight concessions. During the 1980s, the price of gold directly affected the value of rand and therefore, the prices at which exports were sold overseas. As the gold price fluctuated, the exchange rate of the rand fluctuated and export revenues responded accordingly. Attempts to liberalise trade in the early 1980s were halted in the mid-1980s because of intensified balance of payment pressures.

Bell (1997) identified the year 1983 as the beginning of a more intensified period for trade liberalisation. This period was characterised by a decline in the pace of economic expansion, which can be ascribed to the collapse of the gold price, a sharp decline of exports in general, burgeoning foreign debt and heightened political instability. Revision culminated in the introduction of a more powerful system of export incentives designed to ease the pressure on exporters of the comparatively higher cost of local production and delivery to overseas markets. Customs duty drawbacks and duty exemptions were granted. The incentive system was further negated by the massive real appreciation of the rand, accompanied by a world recession which led to the beginning of a sharp decline in South Africa's exports.

The abolition of the dual exchange rate in 1983 was accompanied by the implementation of export subsidies to reduce the anti-export bias inherent in the economy. The process of trade liberalisation was further enhanced in 1985 when the government changed the publication of a positive list to a negative list of items that needed approval prior to importation. With the imposition of financial sanctions and the debt standstill in 1985, balance of payment pressures halted and even reversed progress on trade liberalisation. While capital flight from South Africa dates back to the early 1960s, more concerted action by creditors was precipitated in 1985 when a US bank announced that it would not be rolling over its short-

term loans to South Africa. Other US banks followed suit, causing a full blown liquidity crisis for the South African economy. In the same year, however, a debt crisis arose, which can be attributed to a dramatic reduction in foreign direct investment and short-term capital inflows, culminating in a large and sustained balance of payments deficit.

This resulted in some policy reversals, with the re-imposition of the dual exchange rate system coupled with a significant real depreciation of the rand and the introduction of a 10% import surcharge. The latter contributed to an increase in the weighted average of the effective protection rate from 30% to 70% in 1987. Effective protection rates ranged from a low of 1 %(for non-electrical machinery) to a high of 348% for synthetic resins, compared to a range of 1% to 143% respectively for the same commodities in the preceding period (Jenkins, Carolyn and Siwisa, 1997).

Towards the end of the 1980s, South Africa's commitments to trade liberalisation became more evident. In 1989, only 20% of such requests were supported, as opposed to 38% in 1988 and 65% in 1987. Export promotion was further enhanced in 1989 by the introduction of sectoral 'structural adjustment programmes'. According to Black (1996), these programmes were aimed at enhancing the competitiveness of local industry via selection and targeting, on the grounds that comparative advantage was not a static concept and be created by governments. Emphasis was also laid on the role of the state regarding technology transfer policy, with foreign exchange applications being evaluated on criteria such as the amount of royalty payments, restrictive clauses (on exports) and the existence of alternative local sources of technology. These programmes generated considerable conflict between the DTI and the BTI, with the former criticising the complicated and unmanageable programmes that were clearly unaffordable on the grounds of insufficient staff for implementation and openness to fraud on the part of exporters.

By the end of the 1980s, South Africa had the most tariff rates, the widest range of tariff and the second highest level of dispersion among developing countries (Jonsson and Subramanian, 2001). The country had a very restrictive trade regime, with an unweighted average tariff rate of 25% (Ketil, 2006). Also, by the late 1980s, spurred by action in the

United States and the Commonwealth countries, South Africa faced formal sanctions on its exports of coal, iron, steel, uranium and agricultural products to a number of industrial countries and on its imports of petroleum, computer and high-technology equipment.

2.2.2 South African trade regime 1990-2006

Trade patterns in the South African economy are analysed with a particular reference to the 1990s. After years of political struggle, the first democratic elections in 1994 marked the end of apartheid government and thus the birth of new economic and development challenges for the new government. South African export and investment performance improved markedly, particularly the post 1994 period, coinciding with the demise of apartheid, the ending of sanctions, and the adoption of more liberal economic policies. With the end of apartheid, South Africa has shifted towards greater integration into the global economy. Growth, Employment and Redistribution (GEAR) substantially liberalised international trade with the hope of expanding employment and promoting economic growth, diversification and export growth, particularly of manufactured goods.

To differentiate itself from the previous protectionist government, the new government agreed to an ambitious trade liberalisation program. Trade liberalisation is the relaxation or elimination of tariffs and removal of duties and/or quotas on exports, alteration in non-tariff barriers. Examples include: import quotas and quantitative restrictions, changes in licensing and direct allocation of foreign exchange and in specific regulations for products, and removal or relaxation of export subsidies (Bienen, 1990). Trade liberalisation started gaining momentum in the early 1990s. The 1990s experienced the birth of a massively significant period of economic, political and social change in South Africa. As a result, South Africa adopted a two pronged approach to trade liberalisation during the 1990s. These included (i) unilateral trade liberalisation and (ii) multilateral trade liberalisation in the context of the Uruguay Round of trade negotiations.

There was a shift in the direction of trade policy, from inward-looking import-substituting industrialisation to a more outward–oriented focus, with special emphasis on the promotion of competitiveness. Theoretical arguments suggest that countries that follow outward-oriented trade policies generally perform better economically than those that pursue protectionist trade policies. South Africa shifted towards a more capital intensive export structure during the early 1990s (Tsikata, 1999).

South Africa had a rapidly declining share of those exports that use unskilled labour, with the share in total exports declining from 55.3% in 1992 to 20.8% in 1996. South Africa embarked on new economic and trade reforms among others, South Africa embarked on a programme of comprehensive trade policy reform. Trade liberalisation in South Africa came about as a result of the failure of the import substitution approach of industrialisation. South Africa's five year trade liberalisation programme was meant to help its products compete internationally. To illustrate the policy shift that occurred after independence, key events in South Africa's trade liberalisation during the 1990s are as follows:

- From 1991-1994 trade sanctions were removed by many countries that were previously trading with South Africa, after recognizing the dismantling of apartheid, making it relatively easier to export and import.
- Quantitative restrictions were converted to tariffs from 1994-1997 and import surcharges were also eliminated in 1994 thus allowing better flow of goods.
- The year 1995 saw reductions in tariff in line with World Trade Organisation (WTO) requirements. During the same year a dual exchange rate regime was abolished to a float regime.
- In 1995 negotiations with the Europeans over the creation of a Free Trade Area (FTA) commenced and continued throughout the years, only to be concluded in late 1999, the agreement was made to be effective from January 2000.
- In 1998, the rand depreciated sharply and continued to do so in the period, before stabilising around 2004-2005.

2.2.3 Unilateral trade liberalisation, 1990-1994

Between 1990 and 1994, trade liberalisation largely took the form of eliminating the remaining import licensing procedures that were in place and reducing import tariffs. The average tariff was reduced from 28% to 16% while the import surcharge was eliminated. Thus the sum of all charges on imports was reduced from 34% to 16%. Since South Africa's policy conversion from import substitution to export led growth in the beginning of the 1990s, the country experienced considerable growth in foreign trade. By 1992, only 15% of tariff lines in the manufacturing sector were subject to import licensing which had become virtually automatic, hence less restrictive. Only agriculture, manufacturing sectors and the clothing industry remained subject to licensing (Jonsson-*et al.*, 2001).

By 1990, there were four types of export subsidy: (i) an input compensation, whereby exporters could receive half the cost of protection afforded to imported inputs; (ii) a value-added compensation, whereby exporters could receive 10% percent of the value added of export sales; (iii) a marketing development scheme; and (iv) a marketing allowance provided under the Income Tax Act. The last two subsidy schemes were introduced to partly compensate costs incurred in the development of new export markets for the country's products (Kusi, 2002).

South Africa introduced policies to change its historic reliance on trade in primary products, especially through the continuation of various demand side export subsidies, notably the General Export Incentive Scheme (GEIS). South Africa made a shift to a more export oriented trade regime with the introduction of export subsidies under the General Export Incentive Scheme (GEIS), and the gradual removal of surcharges and the remaining quantitative restrictions.

The introduction of the GEIS, was mainly designed to help exporters offset the price disadvantage they faced in international markets, and was implemented through a selective system of liberal tax-free grants. These grants increased through four phases of higher value added and domestic content, with industries characterised by both high value-added and high local content qualifying for a nominal subsidy of 19.5% of export turnover, while those firms

with low valued-added and low domestic turnover qualified for only 2%. The GEIS also took into account fluctuations in the rand value compared to a basket of major international currencies. Imported materials benefiting from the duty drawback system were, however, ineligible for any compensation under the GEIS scheme. GEIS was important in stimulating exports. The effective subsidy on GEIS ranged from 5% to 18%. In its first year about R800 million was budgeted. By 1992 GEIS was running at R2 billion. Payments to GEIS totaled R1.5 billion, R1.43 billion and R1.37 billion in 1993, 1994 and 1995 respectively (Tsitsika, 1999). Various measures were also proposed with the aim of expanding exports. These included lower corporate taxes, encouragement of higher domestic savings, realistic exchange rate policies and an improvement in the supply of skilled labour.

A major turnaround of trade liberalisation in South Africa was motivated by a publication of the Industrial Development Corporation (IDC) entitled *The Modification of the Application of Protection Policy* (Lipton and Simkins, 1993 pg. 213). The report argued for export orientation to replace the import substitution strategy. IDC recommended for a much more uniform and lower tariff structure to reduce the dispersed and complex, relatively high protective structure, and encouraged anti-dumping measures and gradual downward adjustment of tariffs to predetermined levels.

2.2.4 Unilateral trade liberalisation, 1994-1998

South Africa trade reform from the period 1994 to 1998 can, at best, be characterised as a process of gradual import liberalisation. This entailed a number of policy changes. There was, firstly, a process of reduction in nominal tariffs, particularly in manufacturing, which has historically been the most protected sector. Secondly, there was a decline in the dispersion of the number of tariff bands and categories, which automatically enhanced protection in the economy. Thirdly, the elimination of surcharges and quantitative controls, particularly in agriculture, has been significant.

Unilateral tariff liberalization, which was scheduled in 1994, went beyond the Uruguay Round commitments. In June 1994, the government began the dismantling of the system of

import surcharges by removing the 5% surcharge on intermediate and capital goods. This was followed in September 1995 by the removal of the 15% surcharge on motor vehicles. In October 1995, the 40% surcharge on home electronics and luxury products was abolished, completing the dismantling of the system of import surcharge. A large number of changes to the tariffs on non-agricultural commodities took place between 1994 and 1996. For intermediate goods, the import weighted average tariff rates, excluding zero rated tariffs which were cut from 16% in 1994 to 15% in 1996. For this group of goods, the weighted average tariff rates exceeding zero dropped in 9 out of 30 categories between 1994 and1996. This policy was expected to expire in 1999. As a result of these changes, South Africa's trade regime has been considered liberalised since the early 1990s. All quantitative restrictions have been eliminated, including those operating through agricultural marketing boards. The tariff regime has been rationalised, with the number of lines having been reduced (Jonsson *et-al.*, 2001).

2.2.5 Multilateral trade liberalisation, 1995-2002

South Africa made a tariff offer phased over five years that took effect on January 1, 1995 in context of the Uruguay round. The key elements of this policy reform programme included:

- Industrial tariff reduction averaging one third by 2000
- Increase the number of bindings on industrial products from 55% to 98%. Replace formula duties with tariffs and reduce the number of tariff rates.
- Rationalising the number of tariff lines
- Converting quantitative restrictions and formula duties to advalorem tariff rates; lower all bound agricultural tariffs by 21% on average and reduce export subsidies by 36%.
- Termination of export subsidies in July 1997; the General Export Incentive Scheme was phased out by 1997.

The reductions of tariffs and phasing out of subsidies have been accompanied by a shift in policy towards market-led supply-side support measures. A wide range of WTO compatible supply-side measures have been put in place to facilitate investment and export promotion.

Liberalisation in the 1990s played a very important role in stimulating exports in general and non-commodity exports in particular and that, at a sectoral level, strengthened the impact of lower tariffs in making exporting more attractive was stronger. Trade liberalisation contributed into providing South Africa with a more diversified and sustainable export sector. Most current imports are tariff free, with the most extensive tariff liberalisation in the manufacturing sector.

In addition to multi- lateral liberalisation, the government also engaged in a number of bilateral trade agreements including the signing of the SADC, Free Trade Protocol in 1996 and the implementation of the South Africa-European Union Trade, Development and Cooperation Agreement (TDCA) in 2000. Another export incentive of the South African government was the Export Marketing Assistance Scheme (EMA) which offered financial assistance for the development of new export markets through financing for trade missions and market research.

In the five year period 1997 to 2002, merchandise exports increased by 131.3% from R122.8 billion in 1997 to R284.1 billion in 2002. This represented an average annual growth of 1.3 % (Ligthelm, 2004).

2.3 South Africa's export structure and export growth

The composition of exports has changed with manufacturing displacing mining as the dominant export sector. In the early 1980s, the mining sector exports accounted for between 60% and 65% of total exports including service exports. The bulk of this was gold, which accounted for between 35% and 52% of total merchandise exports (Bell, 1997). With the decline in the gold price in the late 1980s and the declining grade of ore, the share of mining exports in total, gold in particular fell dramatically. In contrast, in response to relatively strong export growth, the share of manufacturing in total exports rose. In the 1990s, manufacturing overtook mining as the most important sector, accounting for 53% of total exports by 2000.

Table 2.1 Structure of South African exports

	1990	2005
Gold	29%	9%
Primary Products	27%	20%
Beneficiated primary products	28%	40%
Material intensive products	6%	6%
Manufactured goods	10%	25%

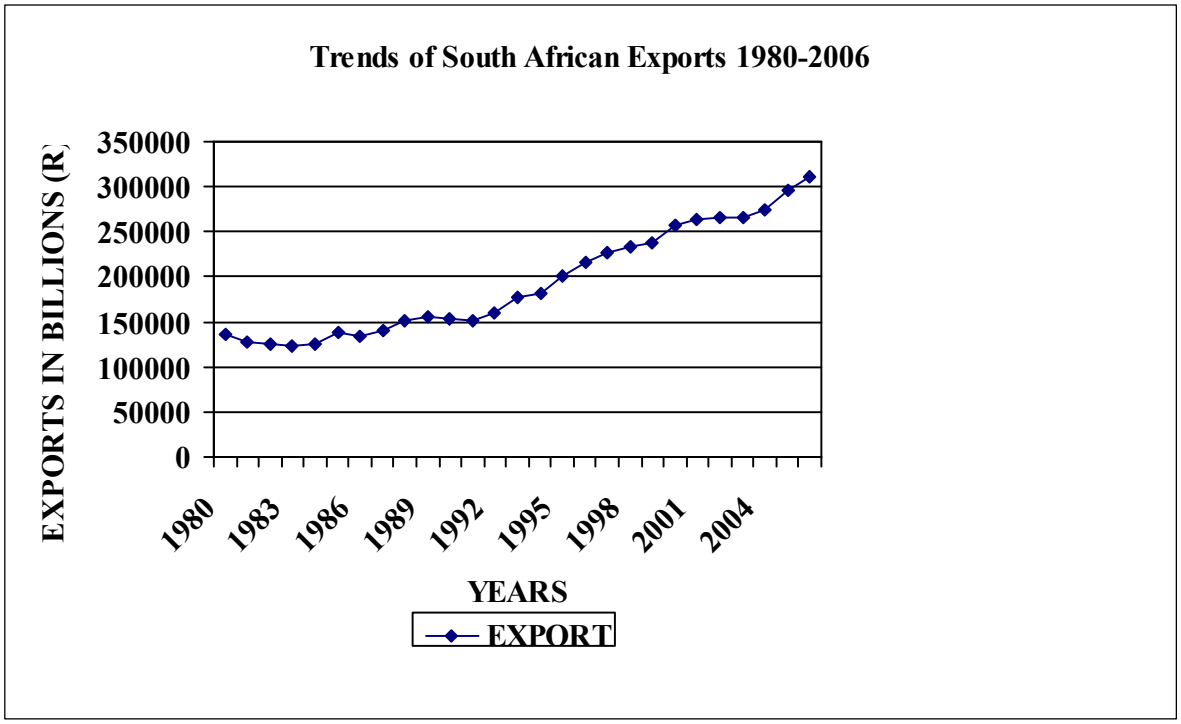
Source: IDC, 2005

The structure of exports has changed considerably especially during the period 1990 to 2005 as shown by table 2.1. Gold contributed 29% in 1990 but the production of gold declined from 29% in 1990 to less than 10% in 2005. The re-admittance into global economy helped the manufacturing sector to increase its share in the overall export basket. Primary products exported fell from 27% to 20% whilst beneficiated primary products increased from 28% to 40%. The South African performance has improved markedly during the 1990s, coinciding with the demise of apartheid, the ending of sanctions and the adoption of more liberal, economic policies.

2.3.1 Trends of South African exports during 1980-2006

Between 1980- 1989 South Africa's total export performance has been significantly affected by the decline in gold exports, mainly as a result of a weaker gold price and falling production. Due to the introduction of financial sanctions in 1985, the balance of payments pressure halted and even reversed progress on trade which resulted in slow growth of exports. To maintain exports, South Africa had to sell its coal at 10% percent discount below world price (Gouws, 2005). However, South African coal exports continued to grow during the late 1980s and become the most important export after gold. South Africa's overall export performance was superior in the period 1990-2000. This period recorded the best growth of total exports. The trends of South African exports can be shown clearly using a diagram.

Figure 2.1 Trends of South African exports 1980-2006



Source: Economic Research Unit Database (DTI), 2008

Figure 2.1 shows that in real terms, exports increased steadily throughout the 1980s and 1990s from a total of R150 billion in 1980, exports increased to R200 billion in 1995 and again R300 billion in 2005. The country has experienced an impressive growth in exports which can be attributed to various factors from 1998 to 2002. Despite depressed world market conditions, South Africa has succeeded in steadily growing and diversifying its export base in recent years both in terms of products and trading partners. This follows many years of trade isolation and inward looking policies. While the sharp depreciation of the local currency has certainly made a significant contribution, it does not fully explain the recent trends. Other factors such as improved competitiveness and supportive government policies also appear to have played an important role.

The strong export growth is supported by the South African Revenue Services (SARS) trade statistics which showed that since 1998, the trade surplus improved tenfold, from R3, 9 billion to R39.4 billion. This was largely due to the fact that the nominal rand value of South African merchandise trade almost doubled in the same period from R234.3 billion in 1998 to

R265. 8 billion in 2002. Driving this massive growth is the strong increase in both the value of imports and exports from 1998 to 2002.

2.4 Growth of individual products over time

The increased openness of the South African trade regime is reflected in rising shares of exports. The increased openness occurred across most sectors. An examination of growth rate of South African exports between 1990 and 2000 reveals some interesting trends. Overall, it can be seen from table 2.2 that the highest percentage growth in exports is attributed to nickel 202. 9% and closely followed by Zirconium 200.9%. High value added exports are light vessels and floating docks (HS8905). Aluminum wire and tar distilled from coal contributed the lowest percentage growth in exports.

Table 2.2 Top 10 Growth rates of South African exports, 1990-2000

HS4	Description	Percentage growth in exports
7506	Nickel plates, sheet, strip and foil	202.9
8109	Zirconium and articles thereof, including waste and scrap	200.9
2708	Pitch and pitch coke, obtained from coal tar or from other mineral tars	159.0
8905	Light-vessel, fire-floats, dredgers, floating cranes and other vessels the navigability of which is subsidiary to their main function, floating docks, floating of submersible drilling or production platforms	148.1
6704	Wigs, false beards, eyebrows and eyelashes, switches and like of human, animal hair of textiles, materials, articles of human hair not elsewhere specified or included	131.4
4401	Fuel wood, in logs, in billets in twigs in faggots, sawdust	125.3
2901	Acyclic hydrocarbons	122.6
9401	Seats	104.4
7605	Aluminum wire	98.1
2706	Tar distilled from coal, from lignite and other mineral tars	96.9

Source: Customs and excise, 2007

2.5 Growth trends in manufactured exports

South Africa's manufactured export industry underwent a fierce structural adjustment process prompted by the new industrial and trade policy reforms. As a result, considerable changes of competitiveness were deliberately manipulated, leading to the fluctuations of the performance of South Africa's capacity to trade in manufactured goods. South Africa is exceptionally endowed with rich mineral resources including gold and diamonds; hence the need to develop a competitive manufacturing sector never seemed urgent. A central objective of the South African trade policy has been to reduce the country's dependence on primary products, in particular the heavy dependence on gold, in the export basket. The country had a

dismal performance in the 1980s, with manufactured exports actually declining in nominal dollar terms while some Asian countries had annual growth rates in excess of 20% and many others had growth rates of more than 10%.

South Africa's exports throughout the 1980s were primarily mineral resources. Naturally, with the declining importance of gold and mineral resources, coupled with imminent political changes in the economy, the National Party (NP) government in the 1980s began to turn its attention to developing a more competitive manufacturing sector. South Africa's trade profile has undoubtedly changed radically over the years. While minerals are still important, gold contributes to about 15% of South Africa's total exports. Manufacturing has become more important but the challenges of diversification still remain (Bell, 1997).

Exports of manufactures have increased but not by enough to generate an export-led growth boom similar to that of East Asia and a few other dynamic emerging economies. South African manufactured exports are relatively capital intensive and imports of manufactured goods have increased markedly (Tsikata, 1999).

In the 1990s, the composition of South African exports shifted sharply towards manufactures away from mining, and by the end of the decade, manufactures constituted more than half of South Africa's exports. The declining share of mining partly reflected the decline in the world price of gold, but also resulted from an impressive average annual growth rate of manufactures in real terms of 12 percent. The increasing share of manufactures in South African exports in the 1990s was abetted by a substantial increase in such exports to other developing countries, notably in Africa.

Export volumes were, however, hit in the early 1980s by the general decline in commodity demand and slower world trade. The volume index (2000=100) fell from 56% in 1980 to 51% in 184. Thereafter, export volumes recovered, reaching 66 in 1988. In the early 1990s, South Africa's exports of manufactures boomed with a growth rate of above 20%, which was in the vicinity of those of the most dynamic emerging economies. Manufacturing exports accounted, on average, for 32% of total exports in each year of the 1980s, rising to an

average of 49% in the 1990s. The growth in manufacturing exports in the 1980s was underpinned by the increased exports of non-ferrous metals, iron and steel, and food products, and in the 1990s by iron and steel, chemicals, machinery, motor vehicle parts and accessories, non-ferrous metals and food products (Economist Intelligence Unit (EIU), 1992).

Between 1996 and 2000 South Africa's total exports increased on average by 6.7% per annum. Manufacturing exports increased at an even faster rate, of 9.2% per annum over this period. As a result, the share of manufacturing in total exports increased from 67.5% in 1996 to 73% in 2000. Over the same period, GDP in South Africa grew on average by 2.32% per annum. South Africa's world market share of total manufactured exports rose only marginally from 0.3% to 0.33% between 1988 and 2002 (Naude-*et-al.*, 2004).

Table 2.3 Exports and GDP growth and average annual nominal exchange rate

YEAR	%GROWTH IN TOTAL EXPORTS	%GROWTH IN MANUFACTURED EXPORTS	% GROWTH IN GDP	RAND: DOLLAR EXCHANGE RATE DEPRECIATION
1996-97	2.1%	-4.08%	2.66	7.2%
1997-98	5.67%	5.81%	1.65%	20.1%
1998-99	3.30%	14.45%	21.13%	10.5%
1999-2000	16.62%	20.53%	2.84%	13.5%
AVERAGE	6.7%	9.2%	2.32%	12.8%

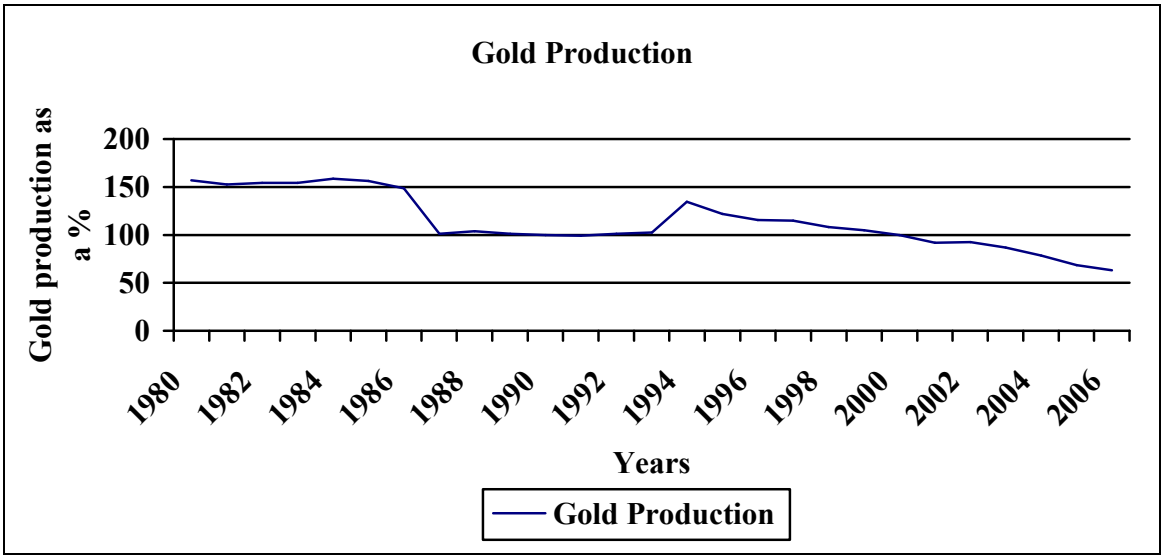
Source: WTO, 2007

As shown in table 2.3, the period 1996-2000 saw significant growth in manufacturing exports from South Africa. The period also saw a significant depreciation in the rand.

Gold was by far the country's largest export commodity up to the early 1990s, and export proceeds were subject to large swings as the gold price moved. The volume of gold produced

and exported fell. The drop in output was halted as a number of new shafts and some dump reprocessing schemes came on stream. Labour problems also contributed to the decline in output in the mid-1980s. Gold exports witnessed a precipitous decline in the 1990s, reaching 60% in 2005.

Figure 2.2 Gold production in South Africa 1980-2006



Source: International Financial Statistics, 2007

Gold has been the main driving force behind the expansion of South Africa's external trade. Gold provided the export surplus that enabled larger volumes of imports to be maintained. The dramatic decline in the role gold played, given in the table 2.2, shows how gold sales dropped from 158% in 1980 to 100% in 1990, a decrease of almost 58% in one decade. The decline was persistent but erratic, depending upon the movements in the gold price and the depreciation of the rand. The economy experienced a severe adjustment that was made worse by the deteriorating political situation both at home and overseas. By 1994, gold production had dropped to its lowest level as a proportion of exports since the development of the first gold mines on the Witwatersrand in the 1880s.

There is a slow but clear upward trend in the growth of non-gold commodity exports although it is more sluggish in the 1980s. Since the entire period, gold exports volume declined. The non gold commodities were basically the only source of export growth. The

growth was sufficient, however only to raise the aggregate volume of exports of goods and services in 1991 to 20% above its levels in 1980. Since 1985, the percentage of merchandise exports continuously exceeded the contribution of net gold exports and the growth rate of total exports. It is clear that total export performance has been significantly affected by the decline in gold exports, mainly as a result of a weaker gold price and falling production since 1980. They were offset by a strong increase in non gold merchandise and service exports especially since the early 1990s.

2.5.1 Regional Breakdown of South African manufactured exports

The regional breakdown of South Africa's manufactured exports indicates that the SADC region is the major market for more than half of the exporting manufacturing firms. Table 2.4 indicates that since 1990, the geographical destination of manufactures remained relatively constant, with food, chemicals, basic iron and steel and non-ferrous metals prominent in almost all the regional markets.

Table 2.4 A geographical breakdown of South Africa's manufactured exports (%)

Clusters: 1990	**SADC**	**NAFTA**	**EA**	**EU**
Food	10.8	1.1	14.8	13.4
Beverages	2.9	0.1	0.3	0.7
Textiles	3.1	1.0	4.9	3.1
Chemicals	15.1	11.3	7.3	7.6
Steel & iron	10.5	29.1	42.6	14.2
Non-ferrous metals	9.7	14.6	13.5	17.2
Equipment	13.5	6.9	0.9	5.4
Electrical machinery	4.1	0.5	0.2	0.9
TV, radio equipment	0.5	0.5	0.1	0.9
Motor vehicles	7.5	8.8	1.2	4.4
Clusters: 1994	**SADC**	**NAFTA**	**EA**	**EU**
Food	9.4	4.9	8.5	13.0

Beverages	4.0	0.1	0.1	0.1
Textiles	3.2	5.1	5.1	4.5
Chemicals	15.7	21.3	10.9	10.6
Steel& iron	7.5	31.7	34.8	14.1
Non-ferrous metals	5.7	7.9	14.1	8.7
Equipment	12.1	4.2	1.0	4.9
Electrical machinery	2.6	0.4	0.5	1.9
TV, radio equipment	0.5	0.2	0.1	0.4
Motor vehicles	9.1	4.1	4.4	9.2
Clusters: 1998	**SADC**	**NAFTA**	**EA**	**EU**
Food	11.5	4.7	8.7	6.8
Beverages	3.7	1.1	0.6	3.5
Textiles	2.2	4.9	1.4	4.5
Chemicals	17.0	16.7	10.4	7.8
Steel & iron	14.1	6.7	1.4	8.4
Non ferrous metals	19.0	8.1	9.9	14.3
Equipment	2.8	0.6	0.6	2.5
Electrical machinery	1.9	0.4	0.1	0.7
TV, radio equipment	8.7	6.2	3.5	16.9
Motor vehicles	5.8	6.3	23.8	5.5
Clusters: 2002	**SADC**	**NAFTA**	**EA**	**EU**
Food	11.9	3.6	5.6	5.9
Beverages	4.2	1.8	0.4	4.6
Textiles	3.2	8.2	1.5	3.0
Chemicals	18.7	17.7	6.5	8.2
Steel & iron	6.9	16.8	26.9	12.4
Non-ferrous metals	7.4	7.0	24.1	12.4
Equipment	13.2	10.1	2.0	17.5
Electrical machinery	4.0	0.7	0.6	2.2
TV, radio equipment	1.9	0.2	0.3	1.1

Motor vehicles	10.8	20.5	14.5	16.5

Source: Economic Research Unit database (DTI), 2006

Table 2.4 shows that mechanical goods and parts, electrical machinery, equipment, furniture, steel and iron and motor vehicles have been dominant. The North America market was dominated by primary exports in the early 1990s, with a dramatic acceleration of manufactured exports since the mid-1990s. Whilst electrical machinery and equipment and motor vehicles and parts exports have featured prominently in recent years, mineral goods still contributed a sizable percentage share of total exports. The SADC market exhibits a sectoral dispersion of manufactured exports different from the other markets analysed. Equally important are both the primary and manufactured exports although the manufactured export industry is the only industry wherein South Africa registers a trade surplus (Moloto, 2004).

2.6 The variety of composition of exports

When recession was afflicting South Africa's main trading partners and the gold price was declining, not even the persistent depreciation in the value of the rand could produce export growth comparable to that of the previous decade. In monetary terms, exports declined only in 1982, but in real terms real declines occurred in six of the 10 years. There were a lot of changes that were taking place in the composition of exports since 1980. The relative importance of gold declined. Table 2.5 gives the factor by which the exports of certain manufactured commodities increased at a faster rate than exports as a whole, thereby increasing their relative weighting in the basket of commodity exports.

Table 2.5 The value of selected commodity exports in 1989

	Rand (m)	Factor
All Export	58 804.8	2.9
Gold Exports	18 993.6	1.8
Base Metals	9 095.0	5.7
Iron & Steel	6 015.1	5.7
Precious Metals & Jewellery	5 436.3	1.9
Coal	3 896.9	5.4
Capital Goods	2 465.0	9.0
Chemical Products	1 974.4	5.0
Paper, Pulp &paperboard	1 639.5	8.9
Textiles	1 564. 9	4.4
Machinery	1 060.6	4.0
Transport Equipment	671.9	5.1

Source: Department of Customs & Excise, *Annual reports* and SARB, *Quarterly bulletin, 1994*

Table 2.5 shows that pulp and paper products were the star performers, with their exports increasing nine fold in the decade. Even textiles managed to increase their exports. South Africa's investment in paper making explains the boom in paper product exports. In the 1980s economic imperatives in Africa were stronger than political convictions and those market forces were pushing South African exporters into their own African hinterland, especially for food products, machinery, transport equipment and chemical products (Jones and Inggs, 1994 pg. 113).

2.6.1 Diversification of exports

The share of gold as a percentage of total exports has steadily declined, and the share of beneficiated primary products and manufactured goods have risen. Similarly, while agriculture exports as a whole have declined in significance, wine, fortified wine, citrus and sugar exports still appear among the top twenty exports. One of the most significant increases

in exports is found in the automotive industry. There has been a marked increase in the export of motor vehicles, parts and accessories. This is due to South Africa's motor vehicle industry becoming increasingly connected to the global networks of their overseas based parent companies. In addition, the export of leather upholstery, vehicle seats and parts thereof, catalytic converters with their higher local content of platinum, and alloy wheels have significantly contributed to this increase. The surge in exports of vehicles and automotive components can also be attributed to the implementation of the Motor Industry Development Programme (MIDP), a scheme designed to stimulate exports. The share of agricultural product exports has shown a marked decline as would be expected of a country moving towards increased export of manufactured and beneficiated goods.

A highlight of South Africa's trade regime has been the gradual reorientation from an inward looking economy to an outward-looking economy with emphasis on increased exports, beginning in 1990 and gaining impetus when the country made its formal offer to the WTO in 1994 and entered a stage of trade liberalisation. This has contributed towards a diversification of South African exports away from mining. Diversification of exports increased the composition of products being exported. Thus, export diversification can be widely seen as a positive trade objective in sustaining economic growth.

South Africa shifted towards a more capital-intensive export structure during the 1980s and early 1990s. South Africa has a rapidly declining share of those exports that use unskilled labour, with the share in total exports declining from 55.3% in 1992 to 20.8% in 1996 (Tsikata, 1999).

2.7 Geographical breakdown of South African exports

For years, South Africa's ability to trade with the outside world was severely limited by the sanctions placed on the country by most developed countries as a punishment for South Africa's commitment to apartheid. With the end of apartheid in 1994, international trade has expanded dramatically. South Africa has also made significant moves towards strengthening bilateral ties with its main trading partners. It maintains formal trade relations with various

countries by means of treaties, trade agreements, and membership in international trade institutions. The country sent a delegation to Moscow in mid 1991 to discuss strengthening trade ties, and for the first time, South African companies participated in a trade fair there.

In 1994, Switzerland, an important destination of South African diamonds, purchased the largest share of South African exports. South Africa joined the SADC in 1994 and a trade protocol, envisaging the creation of a free-trade zone over 8 years was signed in 1996. Preferential market access to the major trading blocks was also granted in October 1999. SADC is one the major trading regions for South Africa. Exports to the region are concentrated in high-value added sectors. The most important SADC purchasers of South African exports are Zimbabwe, Mozambique, Zambia, Mauritius, Malawi, Angola and Tanzania. As commercial ties expanded in the 1990s, African countries purchased about 10% of South Africa's exports; Zimbabwe, Zambia and Mozambique were the largest African markets. In addition, official South African trade statistics include all members of the Southern Africa Customs Union (SACU). Goods move freely among SACU member states, which share a common accounting procedure and impose a common tariff structure.

The early 1990s brought a sea of change to South Africa's trade relations with the rest of the world. After the transition to democracy in 1994, South Africa commenced negotiations with the European Union (EU) with a view to improving its contract with the EU market through possible accession to the trade regime. In 1996, the EU mandate of offers to South Africa for the Free Trade Arrangements (FTA) was formally tabled and negotiations commenced for the EU-SA Free Trade Arrangements. Several rounds of negotiations were completed by the end of 1999 giving rise to the Agreement on Trade, Development and Cooperation between the European community and South Africa in 1999. The European Union is the most important trading partner for South Africa. On average, the EU purchases about 54% of the exports from South Africa annually. The internationalisation of the South African economy occasioned by the lifting of sanctions after the apartheid era has had a significant impact on her trading relations with the EU since the early 1990s. Exports from South Africa to the EU market rose from 5.9 billion Euros in 1990 to 8.6 billion Euros in 1993. In 1997, the total exports from South Africa to the EU stood at 9.1 billion Euros (Akinkugbe, 2000).

Britain is South Africa's largest single trading partner. South African exports to Britain in 1998 totaled R22 billion. There has been a steady increase in bilateral trade between France and South Africa, since the end of 1998. South African exports to France totaled more than R2 billion. Bilateral trade between South Africa and Switzerland is worth R6.384 billion a year. Italy is one of the top 5 major trading partners of South Africa, with the two way trading relations amounting to R8 billion in 1997.

The US is another large trading partner of South Africa. South Africa's exports to the US increased from R5.2 billion in 1993 to R14.8 billion in 1998. South Africa is a beneficiary of the US's Generalised System of Preferences (GSP), which grants duty-free treatment for more than 4 650 products, and of the Africa Growth and Opportunity Act, in terms of which an additional 1 783 products were added to the existing GSP products, until September 2008 (South Africa online, 2006).

South Africa's major trading partners in South America are Brazil, Argentina, Chile, Mexico and Peru. South Africa and the Mercosur States signed a Framework Agreement in 2000 which commits them to working towards a free trade agreement. Trade between South Africa and Mercosur grew from R2. 7 billion in 1994 to R6 billion in 2000.

Between 1995 and 2002, trade with the Indian Ocean Rim Association for Regional Co-operation accounted for 14% of South Africa's global trade. Trade with India has grown particularly rapidly, and now stands at over US$2 billion. In south-east Asia, South Africa's strongest ties are with Malaysia, today its second largest investor. Japan is South Africa's biggest trading partner in Asia and its fourth largest overall. At the end of 2002, total trade between the two countries stood at R43.9 billion. In 2002, bilateral trade with South Korea was worth over R10 billion, and with the People's Republic of China, more than R19 billion, a 40% rise over 2001 (South Africa online, 2006). In December 2004, South Africa concluded a preferential trade agreement with Mercosur. Negotiations to reach a similar arrangement with India started in the second half of 2005. The government is also committed to negotiate a trade arrangement with China (African Economic Outlook, 2006).

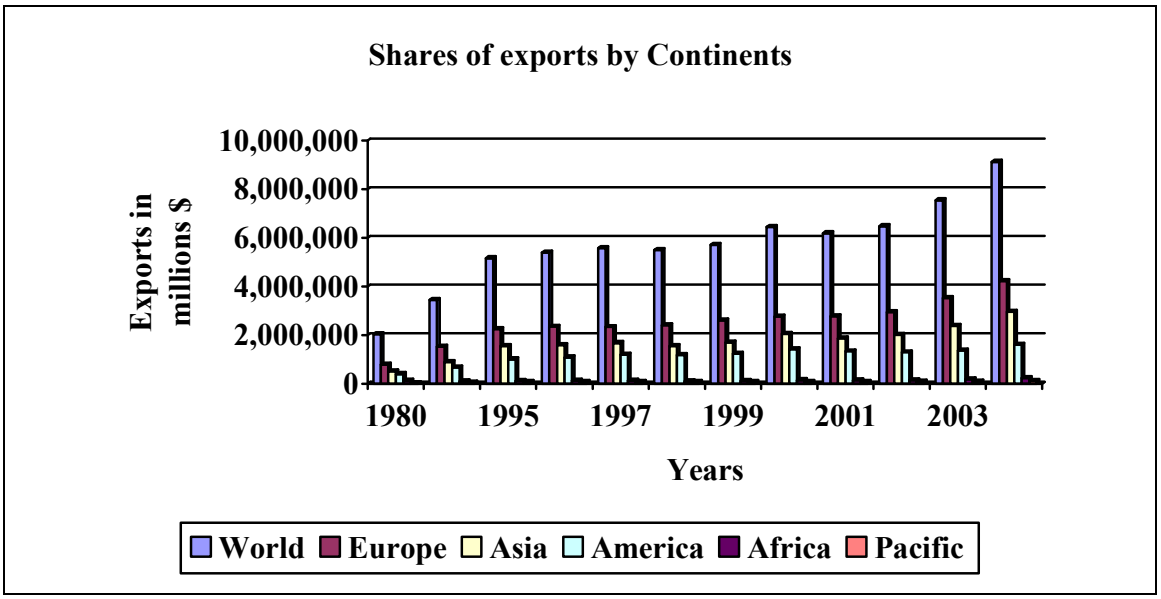
Table 2.6 Share of South African Exports in Main Trading Partner Percent

	1990	1991	1992	1993	1994	1995	1996
EU							
Agriculture	2.0	2.0	1.8	1.7	1.7	1.7	1.8
Manufactures	0.16	0.15	0.16	0.21	0.19	0.21	0.23
Clothing	0.13	0.17	0.22	0.24	0.21	0.19	0.21
Machinery	0.04	0.05	0.07	0.11	0.09	0.09	0.10
UK							
Agriculture	4.2	4.35	3.67	3.66	3.41	3.60	3.33
Manufactures	0.24	0.26	0.28	0.46	0.41	0.44	0.45
Clothing	0.41	0.57	0.97	1.07	0.91	0.90	0.83
Machinery	0.13	0.14	0.14	0.26	0.17	0.19	0.19
GERMANY							
Agriculture	2.3	2.3	1.8	1.6	1.5	1.5	1.5
Manufactures	0.16	0.14	0.16	0.20	0.20	0.23	0.26
Clothing	0.14	0.17	0.17	0.17	0.17	0.15	0.15
Machinery	0.06	0.07	0.10	0.15	0.15	0.13	0.17
US							
Agriculture	0.7	0.8	0.9	0.8	0.7	0.9	0.9
Manufactures	0.12	0.11	0.14	0.16	0.17	0.16	0.17
Clothing	0.11	0.13	0.20	0.23	0.32	0.35	0.35
Machinery	0.03	0.03	0.02	0.03	0.03	0.03	0.04
JAPAN							
Agriculture	1.6	1.3	1.1	0.7	1.2	1.0	1.1
Manufactures	0.38	0.41	0.39	0.38	0.30	0.34	0.33
Clothing	0.0	0.0	0.01	0.01	0.0	0.01	0.01
Machinery	0.05	0.03	0.01	0.02	0.02	0.01	0.01

Source: United Nations COMTRADE data, author's calculations, 2006

Table 2.6 shows that since 1994 South Africa has maintained or slightly increased its manufacturing market share in these major trading partner countries. Apart from Japan, where it has lost market share in most of the selected categories, South Africa either gained or held market share in its manufacturing exports since 1994 in all its traditional partners. While it had performed well in the machinery exports, the country has experienced a secular decline in its share of agricultural exports in the selected group of countries (Tsikata, 1999). The US is the world's largest importer, as well as South Africa's second trading partner, for both merchandise and manufactured goods. South Africa's largest trading partner for both merchandise and manufactured goods is the UK, and the third most important market is Germany.

Figure 2.3 Shares of South African exports by continents



Source: WTO, 2007

Figure 2.3 shows that most of the South African exports go to the European continent. The volume of the exports increased to 3 million US$ especially after 1990 when, South Africa commenced negotiations with the European Union (EU) with a view to improving its market. In addition, a large share of South African exports goes to the Asian continent followed by America. In October 1999, the US granted free access to a range of manufactured products under the African Growth and Opportunity Act (AGOA). Negotiations on a permanent

bilateral free trade agreement with the US have been initiated. The American continent was followed by the Pacific continent and lastly Africa.

2.8 South African exchange rate 1980-2006

A competitive exchange rate is a critical determinant of the export performance in a country. In South Africa, there has been some debate as to whether exports do indeed respond to exchange rate movements. The real effective exchange rate refers to the actual exchange rate after adjusting for differences in prices and costs of production between a country and its main trading partners, and acts as a yardstick for understanding export behaviour. In South Africa's case, the real exchange rate is the external one, usually the purchasing power definition of the real exchange rate. It is calculated as $q = ep/p*$, where the exchange rate, e is the foreign currency per unit of the rand, and $p/p*$ is the ratio of domestic prices, p to foreign prices. Depending on data available and the theoretical approach taken, the choice of p will vary between consumer price indices (CPIs), wholesale price indices, GDP deflators, export and import unit values and unit labour costs. The real exchange rate is useful to analyse bilateral competitiveness. To analyse competitiveness of a country vis-a-vis all trading partners, these bilateral real exchange rates are weighted and combined into a composite index, which is labeled the real effective exchange rate (REER).

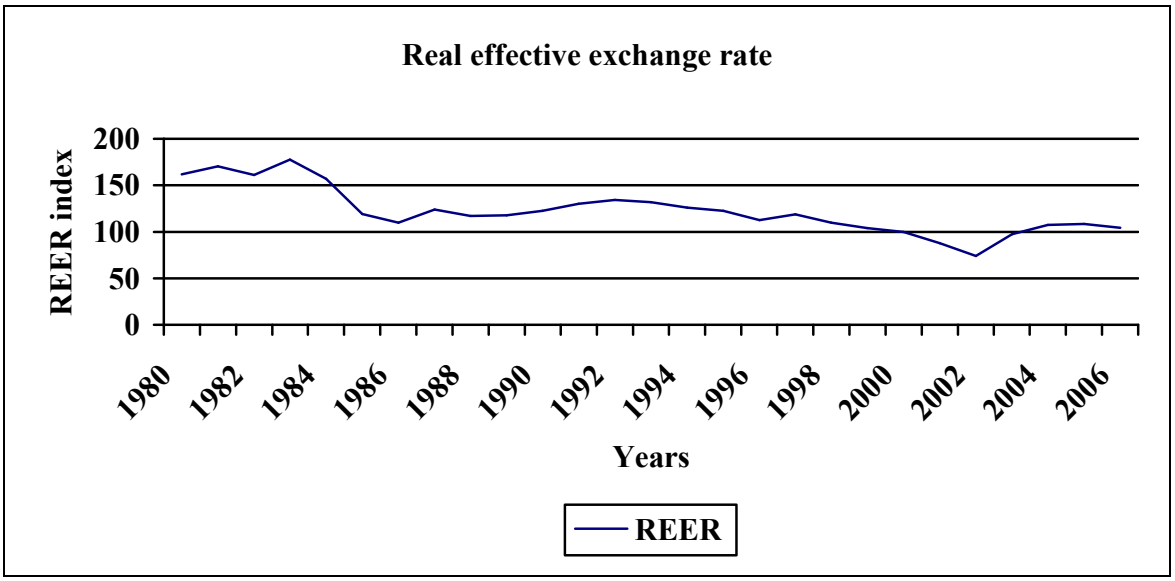
International price and cost competitiveness is an important determinant of trade flows. If South African competitiveness improves, foreign demand for South Africa products should rise as they become less expensive in foreign markets while South African demand for imports would be expected to drop as the latter become more expensive to South African buyers (Golub *et-al.*, 2003).

Prior to the 1980s, the South African currency was pegged. During this period, major shocks in the form of significant gold price changed and political crises resulted in capital outflows and intensified trade sanctions, which complicated the management of the exchange rate. There were also a number of significant regime shifts. These changes were related to changes in policy objectives. The exchange rate was fixed until 1979. In 1979, greater flexibility was

introduced into the foreign exchange market with a dual currency exchange rate system. The Reserve Bank announced an official exchange rate on a daily basis in line with market forces.

This practice ceased from 1983 with the commercial rate determined in the market subject to direct intervention by the Reserve Bank. A second exchange rate, the financial rand, applied to most non-resident portfolio and direct investment. In 1983, the financial rand was abolished. In 1985, following the debt crisis, which was caused by the refusal of American banks to roll-over South Africa's short term foreign debt, the rand fell further. The Reserve Bank maintained a direct influence on the exchange rate through active intervention in both the spot and forward markets (Aron-*et-al.*, 1997). The movements of the real effective exchange rate can be seen in figure 2.4.

Figure 2.4 Real effective exchange rate



Source: International Financial Statistics, 2007

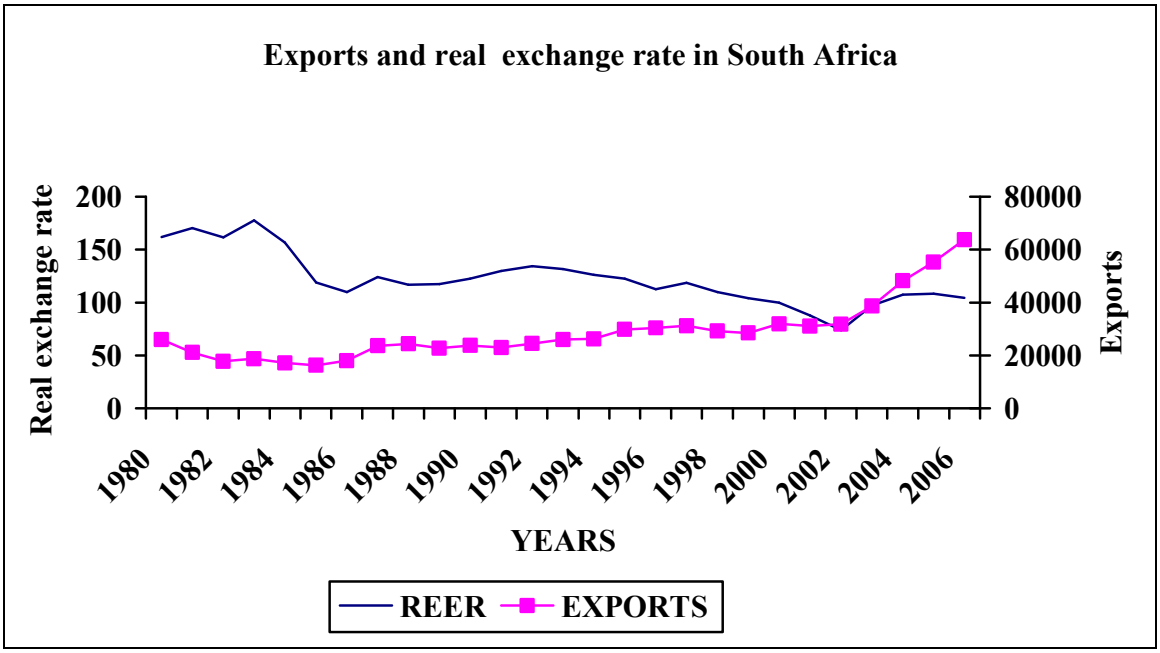
Figure 2.4 shows that from 1988 the Reserve Bank has appeared to be more active in stabilising the real effective exchange rate, partly out of concern for the international competitiveness of South Africa's manufacturing exports, and in particular to prevent excessive appreciation of the real exchange rate at times when the nominal exchange rate tended to appreciate. The real effective exchange rate index (on a 2000 base year)

appreciated gradually from 96.00 in the year 1988, to 104 by the end of 1992, where after it depreciated to 97.18 by the end of 1994. The real effective exchange rate had seen a depreciation of 3% during the year 2000.

2.8.1 Real exchange rate and exports in South

The relationship between real effective exchange rate and exports in South Africa can be illustrated using a graph.

Figure 2.5 Exports and real exchange rate in South Africa



Source: International Financial Statistics, 2007

Figure 2.5 plots South African real effective exchange rate against exports. There was a strong depreciation of the real effective exchange rate in 1985. This was driven largely by the collapse in the nominal exchange rate. However, relatively high inflation in South Africa and large inflows of portfolio capital during the late 1980 appreciated the real exchange rate. Real effective exchange rate appreciated in the early 1990s reflecting South Africa's relatively

higher inflation rate and large inflows of portfolio capital. With the lowering of inflation and speculative attacks in 1996, that level fell significantly. Despite disadvantageous real exchange rate between 1990 and 1992, exports grew. Decline in the REER increased the competitiveness of South African exporters, resulting in significant increase in the exports of South African products.

During 1993-1994 as the exchange rate depreciated, input prices dropped and foreign demand boomed therefore exports increased. This was consistent with the ending of sanctions associated with apartheid and the adoption of more outward oriented economic policies. South Africa witnessed consistent depreciation of her exchange rate to the lowest levels in 2001 and a sharp appreciation thereafter. This was an anomaly because South African exports have grown more rapidly since 2001. The South African rand lost more than 30% of its value against the major currencies of the world towards the end of 2001 but from around October 2002, the rand strengthened reversing past trends. The currency's appreciation was underpinned by the following: the general dollar weakness, an improvement in global commodity price, particularly gold and platinum, favourable real interest rate, differential improved investor sentiment towards the emerging market, and the elimination of South Africa's net open forward currency position.

2.9 Other Determinants of Exports

The ability of export firms also depends on structural constraints such as the availability of good infrastructure, access to finance, negotiated market access agreements and established long term linkages with export markets. Trade policy, improved labour quality, technological progress and the efficiency of regulatory labour and other government institutions will also improve competitiveness of exports in the long run.

2.9.1 Infrastructure

Economic infrastructure such as transport, communication, power, water and sanitation systems provide the foundation for economic activity within an economy. The provision of infrastructure also has important consequences for an economy's export performance by

lowering the transaction costs associated with exporting. The Central Intelligence Agency (CIA) states that South Africa has a modern infrastructure supporting an efficient distribution of goods to major urban centers throughout the region (Gouws, 2005). One of the programs that promoted non gold mineral exports was the development of new harbour facilities, railway lines, and mines, which helped to increase revenues from the export of metal ores at the impressive rate of nearly 18% per year, on average, during the 1980s. Although the infrastructure created by government contributed to export development, the relative cost of using these facilities in recent years has contributed to increased export prices and uncompetitive exports.

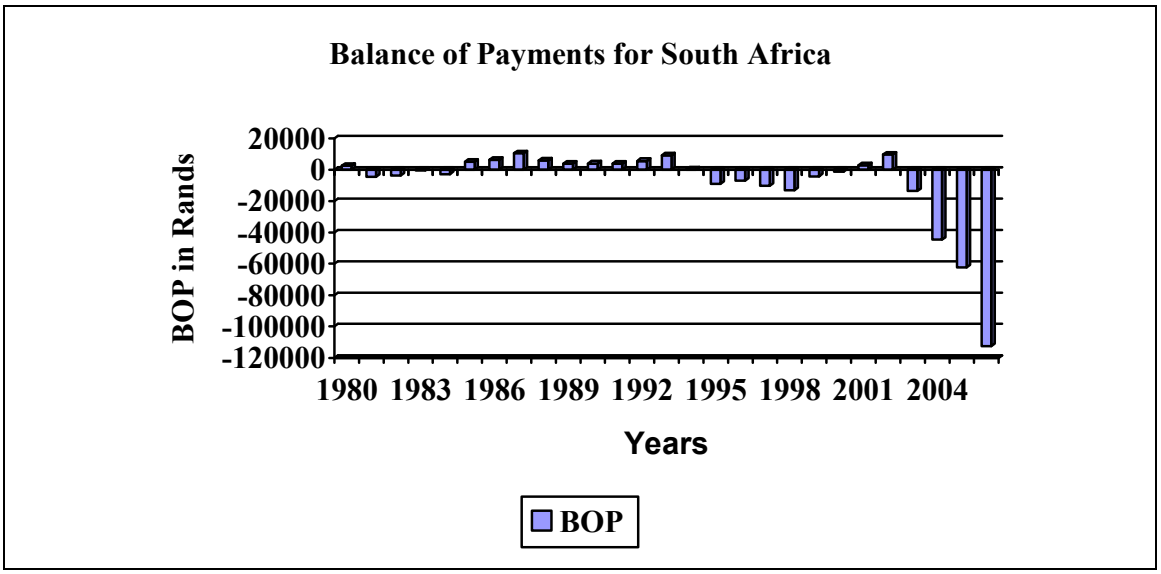
2.9.2 Freight rates

South Africa is far from its major trading partners and increases the transaction costs which are further aggravated by internal transport costs, since much of South Africa's output is produced inland. South Africa is a major sea trading nation accounting for approximately 6% of real world sea trade. Since 1988, South African exporters have continued to gain better market access. On account of the formation of the WTO, South Africa's tariffs have declined. In turn, this reduction in artificial trade barriers has implied that transport costs have become an increasingly important determinant of trade (Gouws, 2005).

2.9.3 Balance of Payments

The structure of the current account of South Africa has been largely influenced by historical developments. Before 1994, the balance of payments was mainly managed with the objective of compensating for the weakness of financial inflows due to a hostile international environment, coupled with the 1985 moratorium on external debt. South Africa was led to produce trade surpluses to generate foreign currency and repay external debt. After 1994, the turnaround of capital flows dramatically changed the need for a positive current account. The positive trade balance in merchandise goods consequently narrowed and the service, income and current account transfer balance increased its negative impact on the current account. The external current account deficit has then remained roughly stable through 1999 and 2000. In 2000 the deficit was 0.6% of GDP, which was close to the 1999 0.4 deficit.

Figure 2.6 Balance of payments for South Africa



Source: Economic data base (DTI), 2008

Figure 2.6 shows that the overall trade balance registered a healthy surplus in 2001 and 2002. The increase in exports reflected the good performance of the agriculture sector coupled with the output growth of the secondary sector. Platinum exports within the mining sector have been boosted by stronger price increase.

2.10 Conclusion

From this chapter, it appears that South Africa's vast natural endowments, especially gold, initially drove the country's trade. The high prices of these commodities limited industrialisation. Historically, South Africa had pursued a development policy based on import substitution. Although, import substitution, initially contributed to industrilisation, it led to high rates of protection which resulted in an anti-export bias. Various domestic and international political and economic events have influenced South Africa's trade, balance of payments, economic activity and policy. It appears as though South Africa's trade is primarily determined by prices, foreign demand, trade policy and sanctions and capacity and capacity utilisation. By the end of the 1980s, South Africa's exports had not changed fundamentally, owing to the emphasis on addressing the anti-export bias. Despite limited tariff liberalisation, the incentive to export increased in the1990s with the introduction of the

General Export Incentive Scheme (GEIS), tailored to foster the export of goods with high local content and value added.

What was more significant in the 1990s was South Africa's commitment to the Uruguay Round, under the GATT. The country committed itself to a five-year tariff reduction and rationalisation programme, which involved the reduction of tariff categories and weighted average import duties. There was also a substantial increase in the proportion of bound tariffs and zero-rated tariffs, together with a reduction by one –third of the simple average industrial tariff.

Besides tariff liberalisation and the abolition of QRs, South Africa has also made significant moves towards strengthening bilateral ties with its main trading partners. The essence of this agreement entails the liberalization of tariffs on 95% of EU imports from South Africa, mostly between 2000 and 2003. While tariffs have declined over the period 1997 to 2001, notably for manufacturing, the overall pace of tariff liberalisation has significantly slowed down, with only a small reduction in the number of tariff bands.

In the wake of the declining importance of traditional exports, South Africa has adopted a rigorous export policy aimed at boosting the manufacturing export sector. A major challenge for South Africa's manufacturing export industry is the low levels of competitiveness, specialisation and adaptability rates in key major exporting groups and regional markets. Despite these drawbacks, manufacturing exports did grow, but not commensurate with the rate of international growth. Thus, low levels of competitiveness, specialisation and adaptability rates warrant an empirical investigation of the possible determinants and growth of exports.

Chapter three

Literature Review

3.1 Introduction

This chapter reviews both theoretical and empirical literature on the determinants and growth of exports. Trade theory advocates that international competitiveness is *inter alia* determined by factor endowments, increased savings and investments, innovations in products and production processes and intensity of entrepreneurial activity. The aim of this chapter is to identify the set of variables that may potentially act as determinants of exports. The chapter is divided into three sections. The first section covers theoretical literature on the determination of exports, while the second section discusses empirical findings on this subject. The last section concludes the chapter.

3.2 Theoretical Literature

This section is aimed at investigating the theoretical determinants of exports. Trade theory can be classified into two categories namely, traditional theory (which has a classical/ neoclassical foundation) and new trade theories. Traditional trade theory incorporates the principles of perfect competition, homogenous goods and constant returns to scale in production. This would include the trade theories of Ricardo, Heckscher and Ohlin and the modifications or extensions of the Heckscher-Ohlin theory. The new theories of international trade on the other hand, would include theories characterised by product differentials, imperfect competition, increasing returns to scale and technological lags that imply dynamic comparative advantage in trade.

3.2.1 The Ricardian Static Comparative Advantage

The theory of comparative advantage was expounded by David Ricardo. The theory explains why it can be beneficial for two countries to trade if one country has a lower relative cost of producing some goods. There are various assumptions underlying the Ricardian comparative advantage; he assumed a labour theory of value to be employed in this model. Thus, the

relative value of a commodity is based solely on its relative labour content. From a production perspective, this implies that no other inputs are used in the production process, or any other inputs are measured in terms of labour embodied in their production, or labour ratio is the same in all industries.

Ricardo also assumed that the economy is characterised by perfect competition. This means that no single consumer or producer is large enough to influence the market, they are all price takers. In addition, all participants have full access to market information. There is free entry to and exit from and industry, and all prices equal the marginal cost of production. Ricardo also assumed that technology is fixed for both countries, so unit costs of production are constant. Thus, the hours of labour per unit of production of goods do not change, regardless of the quantity produced. The model also assumes an analysis of a two-country, two-commodity world to simplify the presentation. All factors of production are immobile and both countries have the capacity to produce both goods. Any imports are perfectly balanced by an equivalent-valued export flow: thus, neither country incurs a trade deficit, which must be financed.

The comparative advantage theory goes further to assert that unrestricted exchange between countries will increase the total amount of world output if each country tends to specialise in those goods that it can produce at a relatively lower cost compared to potential trading partners. In a Ricardian world, trade is determined by relative efficiency in production. It can be shown that it will be in the interest of every country to engage in trade since every country will find a product in which it has a comparative advantage. Specialisation in production will occur and because trading countries face the same relative prices, specialisation will occur in different goods. Thus facilitating exchange between the two trading countries. It is the difference in labour that determines the goods in which the country has a comparative advantage.

Ricardo presented his perception of comparative advantage in trade with a numerical example of two goods and two countries. He posited that production required labour only, and in fixed amounts per unit of output. Comparative advantage was therefore defined

naturally in terms of the unit labour requirements (or equivalently, labour productivities) in the two industries and two countries. Letting *a* be the amount of labour needed to produce one unit of good *1* in country *1*, then country *1* has a comparative advantage in producing good *1*, compared to country *2* and good *2*, if it can produce it with less labour relative to good *2*, compared to country *2*.

The Ricardian model is extended by incorporating wage rates and an exchange rate. This makes it possible to analyse trade in terms of money and prices and to examine the role of wages, productivity and the exchange rate. This monetisation will be accomplished by assigning a wage rate to each country and the domestic value of each good is found by multiplying labour per unit by the prevailing wage rate. This provides money prices in one country that can be used to buy or to sell. Money prices cannot be used to trade until a between two currencies is established. This link is provided by an exchange rate which is the number of units of one currency that exchange for one unit of a second currency (Appleyard *et al.*, 2001, pg. 39-40). A country exports a product when it can produce it the most inexpensively, given wage rate and the exchange rate. The ability of a country to export depends not only on relative labour efficiency but also on relative wage rates and exchange rates. The conditions necessary for one country to export a good can be expressed as follows:

$$\alpha_1 \chi \omega_1 \ell \angle \alpha_2 j \omega_2 \quad \text{.....(3)}$$

$\alpha_{1\chi}$ = the labour requirement per unit in country 1 for good χ

ω_1= the wage rate in country 1 in country 1's currency

ℓ = exchange rate

α_{2j} = the labour requirement per unit in country *2* for good j

ω_2 = the wage rate in country *2*' currency

The above function means that country*1* has a comparative advantage in producing good χ therefore it should export good χ and import good j.

3.2.2 Limitations of the Ricardian Model

Ricardo only considers one factor of production but in reality goods are produced using several factors of production simultaneously, such as capital, land and various types of labour[1]. In addition, Ricardo assumes that factor resources are fixed in quantity, constant in quality across nations, fully employed and not mobile across countries. As far as the mobility of factor resources is concerned, it is well recognised that one major phenomenon of production in the nineteenth and twentieth century relates to the mobility of factor resources. The proliferation of Multi-National Corporations (MNC) over the last century has manifested itself in the transfer of capital, skilled labour and technology across nations. Trade has been one of the main determinants of unequal growth of productive resources in different nations. This is especially the case for resources such as physical capital, entrepreneurial abilities, scientific capacities and upgrading of technological skills of the labour force. Thus, factor endowments and comparative costs are subject to a state of change.

Rapid technological change is an important characteristic of our modern world economy. The strict adherence to the principle of fixed technology would mean that the third world countries would continue producing primary goods for which world demand has decreased. Resource allocation between production activities is not as instantaneous and costless as traditional theory would lead us to believe. Increasing returns to scale is a common feature of the production process. Similarly, monopolistic and oligopolistic market control of internationally traded commodities mean that large individual corporations are able to manipulate world prices and supplies. Thus, joint producers' activities and oligopolistic bargaining among giant buyers and sellers are important determinants of price and quantity on the international market. Also, the exclusion of risk under perfect competition is unrealistic. If developing countries, for example, were to specialise in primary commodities then the risks associated with adverse movements in the terms of trade have to be borne by them.

[1] Skilled labour, unskilled labour and semi-skilled labour

3.2.3 Empirical Tests of the Ricardian Model

Assuming a Ricardian world in which labour was the only factor of production, it was hypothesised that the relative export performance of the United States and United Kingdom in third markets depended upon differences in output per man by industry, which in turn would be reflected successively in differences in unit wage costs, unit value added and unit prices. MacDougall (1951) found that in 1937 United States's average weekly wages in manufacturing industries were twice those in United Kingdom. Where United States output per worker was more than twice that of the United Kingdom, the United States was expected to dominate the export market, and where the US output per worker was less than twice that of the UK, the latter was expected to dominate the export market. The results indicated that 20 of the 25 industries conformed to expectations. MacDougall also found a strong inverse relationship between 1937 relative US and UK wage costs per unit of output and relative exports, and a positive relationship between relative output per worker and relative exports.

Balassa (1963) and Stern (1962) continued and updated MacDougall's original work. Their results indicated that the 1950s relative US and UK export performance established lines of comparative advantage as suggested by labour productivity. Furthermore, the introduction of differences in capital costs per unit of output did not have any significant effect on export performance. Kreinin (1982, 1984) extended the analysis by examining the unit labour costs of the motor vehicle and steel industries relative to national manufacturing average in the United States, Japan and industrialized Europe. He concluded that relative unit labour costs did explain the trade position of the two industries and were a good indicator of comparative advantage. In contrast to this, Bhagwati (1964), Kreinin (1969) and Stern (1975) concluded that their results did not support the comparative cost doctrine and that other factors were important in determining the pattern of trade.

In his 1969 survey of trade theory, Bhagwati examined the logic and underlying assumptions of the Ricardian model and the empirical procedure whereby MacDougall (1951), Stern (1962) and Balassa (1963) had tested the hypothesis. He argued that the procedure was defective in so far as relative export prices could not necessarily be approximated by labour productivities and the other measures employed. Bhagwati did not directly test the doctrine

himself, but instead regressed the relationship between relative unit labour costs and export price ratios. Since his tests produced poor results, he concluded that there is yet no evidence in favour of comparative costs doctrine.

3.2.4 The Heckscher-Ohlin Model and the Factor Endowments

Ricardo explained trade patterns among countries on the basis of comparative advantage, which he believed was the consequence of different labour productivities among countries. However, he did not explain what caused these different labour productivities. The effects of factor endowments on international trade were analysed early in the twentieth century by two Swedish economists, Eli Heckscher (1919) and Bertil Ohlin (in 1933). The Heckscher- Ohlin (H-O) theory is more sophisticated than the Ricardian theory in acknowledging that there exists, at least, some commodities that can be produced with various production techniques. This assertion implies that it is not only the relative abundance of a resource that will be important in determining the comparative advantage of a country, but also the intensity of the use of resources in producing the commodities across different countries that will determine the pattern of trade. This analysis makes a number of simplifying assumptions such as that there are two countries, two homogenous goods, and homogenous factors of production whose initial levels are fixed and assumed to be relatively different for each country. The two commodities have different factor intensities, and the respective commodity factor intensities are the same for all factor price ratios.

In addition, the H-O model assumes that production is characterised by constant returns to scale for both commodities in both countries and also that technology is fixed in both countries. Perfect competition exists in both countries. Different factor endowments refer to the fact that nations differ in the amount of productive resources they possess. For example, some nations have a relative abundance of capital therefore capital will be relatively inexpensive. Relative factor abundance may be defined in two ways, the physical definition and the price definition. The physical definition explains factor abundance in terms of the physical units of two factors, for example labour and capital available in each of the two countries. According to the physical definition one country would be capital abundant if its

ratio of capital to labour exceeds the ratio of capital to labour in another country. The price definition relies on the relative price of capital and labour to determine the type of factor abundance characterising the two countries. One country would be capital abundant as long as the ratio of the price or rental rate of capital to the price of labour is less than in another country.

The theory proposes that with identical technology in both countries, constant returns to scale, and a given factor intensity relationship between final products, the relative differences in factor possessions between countries form a basis for trade. However, it is the relative abundance or scarcity of a resource that will determine lower or higher factor costs, thereby implying varying prices for the products. The main assertion of the theory is that a country should export the commodity that uses relatively intensively the relatively abundant factor of production, and import the commodity which uses relatively intensively the relatively scarce resource. Therefore, a country with abundant capital will be able to produce relatively more of the capital intensive good, while a country with abundant labour will be able to produce relatively more of the labour intensive good.

3.2.5 Extensions of the H-O Theory

The Stopler Samuelson Theorem and Income Distribution

The Stopler Samuelson theorem provides a definite answer to a central question in applied economics: What is the effect of changes in the price of goods, caused for example by changes in tariffs on the prices of factors of production? Differences in factor prices among countries will tend to diminish as countries engage in trade. Let us consider two countries say South Africa, which is labour abundant, and the United States which is capital abundant. Let us assume that a labour abundant country like South Africa initiates trade. South Africa will begin to produce a large quantity of labour-intensive goods for export. This will enable South Africa to take advantage of its abundant factor and relatively low wages. This will lead to an increase in the price of the abundant factor, labour in this case, and a decrease in the price of the scarce factor, capital. In contrast, South Africa will be importing capital-intensive goods from the US, domestic production of capital intensive goods will fall and so will the demand

for domestic capital. This will cause the interest to fall slightly. Thus, the result of trade will be a slightly higher wages and slightly lower interest rates in South Africa.

In contrast, the opposite phenomenon will be occurring in the US. As the US increases its production of capital intensive goods for export, the demand for capital will increase, which will then increase the interest rate in the US. United States will reduce its production of labour intensive goods because it will import those from South Africa.

3.2.6 Limitations of the H-O theory

A strong assumption in the H-O model is that tastes and preferences are identical in the trading countries. It is no longer possible to predict the pre-trade autarky prices and thus the structure of trade. The reason is that each country's tastes and preferences could cause it to value the products in very different way. While demand patterns seem to be similar throughout the world, especially among similar socioeconomic income classes, differences in tastes and preferences certainly exist.

A second crucial assumption of the H-O conclusions is that a commodity is always intensive in a given factor regardless of relative prices (the strong-factor-intensity assumption). The degree of substitution between the two factors (labour and capital) is sufficiently different between industries. Labour and capital can be substituted for each other more easily in the production of one good, say cloth than in the production of the other good, say steel so that we cannot guarantee that a given product will always be intensive in the same factor. Thus, predicting trade flows in a two country case is problematic because of factor-intensity reversal. Factor intensity reversal occurs when a commodity has different factor intensities at different relative factor prices. With one country exporting cloth for example, and the other exporting steel in actual trade, one of them will match the H-O prediction, but the other will not. Factor-intensity reversal can interfere with factor price equalisation, because one of the two countries can end up exporting the good that intensively uses its relatively scarce factor.

A third assumption important to the H-O analysis is the presence of perfect competition. This assumption was necessary to guarantee that product prices and factor prices would equalise with trade. In the real world, imperfect information and barriers to entry lead to imperfect competition of many different forms. Other assumptions, such as constant returns to scale and identical technology are not applicable to the real world.

3.2.7 Empirical Tests of the Heckscher-Ohlin

The first major test of the H-O theorem was conducted by Leontief in (1953). Leontief made use of his own invention of an input-output table to test the H-O prediction. To evaluate the H-O prediction for the United States, Leontief imagined a situation where, using 1947 data, the US simultaneously reduced its exports and imports proportionately by a total of $1 million each. The input-output table made it possible to determine how much capital and labour would be released from producing exports and how much capital and labour would be required to produce at home the $1 million of goods no longer being imported. Although the H-O model predicts that the US, a capital rich country, would export capital-intensive products and import labour intensive products, tests proved otherwise.

Leontief postulated that US labour was more productive by a factor three. Leontief's results have produced many studies seeking to explain why these unexpected findings might have occurred. In demand reversal, demand patterns across trading partners differ to such an extent that trade does not follow the H-O pattern. The US demand for capital intensive goods bids up the price of those goods until the US comparative advantage lies in labour intensive goods. Factor intensity reversal occurs when a good is produced in one country by relatively capital intensive methods but is produced in another country by relatively labour-intensive methods. It is not possible to specify unambiguously which good is capital intensive and which are labour-intensive and the H-O theorem cannot be valid for both countries. The Leontief paradox focuses on the factor intensity of the goods that primarily receive tariff. This suggests that in the US, labour will be more protectionist than will owner's capital.

The paradox found by Leontief has spawned many investigations into the question of the validity of the Heckscher-Ohlin theorem in predicting trade patterns. Tatemoto and Ichimura (1959) for Japan, Stopler and Roskamp (1961) for East Germany, and Rosefielde (1974) for the Soviet Union found support for the theorem, since factor intensities of trade flows matched expectations from factor endowments. Vanek (1968) later formalised the H-O theory and popularly named it as the Heckcher-ohlin-Vanek model, establishing the linear relationship between trade and end-factor endowments and extending it to include multi-goods and multi factors. Treflers (1993) confirmed Leontief's claim that the U.S was actually a labour abundant country where factors are measured in productivity equivalent, efficient units. After various empirical tests, it can be concluded that, unless the assumption of identical technologies across countries is dispensed with, the H-O-V model performs poorly.

3.2.8 Dynamic Comparative Advantage

New trade theory provides a more balanced perspective, focusing on both demand and supply sides. Productivity gains from specialisation are amplified through innovation gains, scale economies at the firm level and externalities such as learning and improvement in human capital. The spread of technology across national boundaries means that comparative advantage can change. The most technologically advanced countries generally have the advantage in making new products, but as time passes, other countries may gain the advantage. The new trade theorists discussed some of the short-comings of the static theorists. The most important characteristic of the new trade theory is that it takes into account the market structure in relation to imperfect competition. The core of the new trade theory is that, apart from the traditional theory of international trade, differences in exploitation of comparative advantage or factor endowments in the fashion of the H-O model is not the only reason for international trade. Economies of scale occupy the center of the argument and justify the missing link that factor endowments and static comparative advantage do not explain.

3.2.9 The Imitation Lag Hypothesis

The imitation lag hypothesis in international trade theory was formally introduced (in 1961) by Posner. The imitation lag theory relaxes the assumption in the Heckscher-Ohlin analysis that the same technology is available everywhere. It assumes that the same technology is not always available in all countries and that there is a delay in the transmission or diffusion of technology from one country to another. Let us consider two countries I and II. Suppose that a new product appears in country I. According to the imitation lag theory, this new product will not be produced immediately by firms in country II. The imitation lag is defined as the length of time that elapses between the product's introduction in country I and the appearance of the version produced by firms in country II. The imitation lag includes a learning period during which the firms in country II must acquire technology and know how in order to produce the product. In addition, it takes time to purchase inputs, install equipment, process the inputs and bring the finished product to market.

A second adjustment lag is the demand lag, which is the length of time between the product's appearance in country I and its acceptance by consumers in country II as a good substitute for the products they are currently consuming. This lag may arise from loyalty to the existing consumption bundle, inertia and delays in information flows. This demand lag can also be expressed in a number of months.

Thus, the central point of importance in the imitation lag hypothesis is that trade focuses on new products. This theory has considerable relevance for present day concerns about the global competitiveness of US firms. Further, it seems to be more capable of handling dynamic comparative advantage than are Heckscher-Ohlin and Ricardo.

3.2.10 Product Cycle Theory

This theory was developed in 1966 by Vernon. The product cycle theory (PCT) of trade builds on the imitation lag hypothesis in its treatment of delay in the diffusion of technology. The PCT also relaxes several other assumptions of traditional trade theory and is more complete in its treatment of trade patterns.

The PCT is concerned with the life cycle of a new product and its impact on international trade. Vernon developed the theory in response to the failure of the United States to conform empirically to the Heckscher-Ohlin model. The model emphasised manufactured goods, and the theory begins with the development of a new product in the United States. The new product will have two principal characteristics: (a) it will cater to high-income demands because the United States is a high-income country; and (b) it promises, in its production process, to be labor saving and capital intensive in nature.

The PCT divides the life cycle of this new product into three stages. The first stage is the new product stage where the product is produced and consumed only in the United States. Firms produce in the United States because that is where demand is located, and these firms wish to stay close to the market to detect consumer response to the product. The characteristics of the product and the production process are in a state of change during this stage as firms seek to familiarise themselves with the product and the market. No international trade takes place.

The second stage is the maturing product stage where some general standards for the product and its characteristics begin to emerge, and mass production techniques start to be adopted. With more standardisation in the production process, economies of scale start to be realised. This feature contrasts with Heckscher-Ohlin and Ricardo, whose theories assumed constant returns to scale. In addition, foreign demand for the product grows, but it is associated particularly with other developed countries, since the product is catering to high-income demands. This rise in foreign demand assisted by economies of scale leads to a trade pattern whereby the United States exports the product to other high-income countries.

Other developments also occur in the maturing product stage. Once US firms are selling to other high-income countries, they may begin to assess the possibilities of producing abroad in addition to producing in the United States. If the cost picture is favourable, then US firms will tend to invest in production facilities in other developed countries. If this is done, export displacement of US produced output occurs. Thus, an initial export surge by the United States is followed by a fall in US exports and a likely fall in US production of the good. This

relocation-of-production aspect of the PCT is a useful step because it recognises, in contrast to H-O and Ricardo, that capital and management are not immobile internationally.

The final stage is the standardised product stage. The characteristics of the product itself and of the production process are well known; the product is familiar to consumers and the production process to producers. Vernon hypothesised that production may shift to the developing countries. Labor costs again play an important role and the developed countries are busy introducing other products. Thus, the trade pattern is that the United States and other developed countries may import the product from the developing countries.

In summary, the PCT postulates a dynamic comparative advantage because the country source of exports shifts throughout the life cycle of the product. The innovating country exports the good but then it is displaced by other developed countries which in turn are ultimately displaced by the developing countries. This dynamic comparative advantage, together with factor mobility and economies of scale, makes the product cycle theory an appealing alternative to the Heckscher-Ohlin model (Appleyard *et-al.*, 2001).

3.2.11 Empirical Tests of the Product Cycle Theory

Researchers have examined particular features of the PCT to see if they are consistent with real-world experience. For example, new product development is critical to the PCT, and it is often the result of Research and Development (R&D) expenditures. Therefore, economists hypothesise that, in the US manufacturing sector, there should be a positive correlation between R&D expenditures and successful export performance by industry. A number of tests indicated this result, including those by Keesing (1967) and Gruber, Mehta, and Vernon (1967). Kravis and Lipsey (1992) found that high R&D intensity was positively associated with large shares of exports by US multinational companies (MNCs). Over the last 25 years, greater shares of US MNCs exports have come from overseas production, which is consistent with the direct investment and export displacement features of the PCT. In addition, in 1969, Louis examined the income elasticity of demand of the fastest growing US exports and found

that trade in high-income type products grew more rapidly than other products, again, an occurrence consistent with the PCT.

Among many other empirical works is Hufbauer's (1966) study on trade in synthetic materials. Hufbauer found that the United States and other developed countries tended to export new products while developing countries tended to export older products. Gruber, Mehta, and Vernon (1967) also discovered that research-intensive US industries had a high propensity to invest abroad. This is consistent with the maturing product stage of the theory. In 1972, Morrall found that US industries that were successful exporters also tended to have relatively high expenditures on no payroll costs such as advertising, sales promotion, and so forth. This finding is consistent with the product cycle theory since production of new products involves such spending. Many other studies of PCT features have shown consistency between real world experience and aspects of the theory.

Vernon (1979) later suggested that the PCT might need to be modified. The main alteration concerns the location of the production of the good when the good is first introduced. Multinational firms today have subsidiaries and branches worldwide, and knowledge of conditions outside the United States is more complete than it was at the time of Vernon's original writing in 1966. Thus, the new product may be produced first not in the United States but outside the country. In addition, per capita income differences between the United States and other developed countries are not as great now as in 1966, so catering to high-income demands no longer implies catering to US demands alone. Even with this modification, the salient features of scale economies, direct investment overseas, and dynamic comparative advantage still distinguish the product cycle theory from the Heckscher-Ohlin model.

One hesitates, however, to distinguish the product cycle theory so clearly from the Heckscher-Ohlin model. Dinopoulos, Oehmke, and Segerstrom (1993) constructed a theoretical model that has PCT type trade emerging as a result of differing factor endowments across countries. The model utilises three production sectors in each country: an innovating high-technology sector and outside goods sector that engages in no product

innovation, and a sector that supplies R&D services to the high technology sector. Like H-O, there are only two factors (capital and labor), identical production functions across countries, and constant returns to scale. Assuming that the R&D sector is the most capital intensive sector, a capital abundant country produces a great deal of R&D. This enables a firm in the high technology sector in that country to obtain a temporary monopoly in a new product with patent protection and then to export the product. After the patent expires, production occurs abroad with some export from that location.

In similar fashion, Markusen *et-al.*, (1995) introduced the idea of a life cycle for new technologies containing elements of the product cycle model. Noting the growing importance of technology in the trade of industrialised countries, Markusen *et al.,* (1995) suggest that just as there is a product cycle for consumer goods, there increasingly appears to be a cycle for techniques of production and machinery, as techniques and machines developed in industrialised countries eventually find their way into labour abundant developing countries.

This technology cycle is driven by the capital abundant, high wage countries where there is both a cost incentive and a sufficient market demand to warrant new labour saving technology and new product development. The capital abundant countries thus produce a flow of new products and innovations, with firms often protected by a temporary monopoly through patents to produce for the home market. Since the new labour saving technologies are not consistent with the relative factor abundances in the labour abundant developing countries, those countries initially have little economic incentive to acquire the innovations. Consequently, capital abundant countries export the new products utilising the new technology. Eventually, however, as incomes start to rise in developing countries and even new technologies are produced in the developed countries, the machines embodying the original new technology are exported by capital abundant countries and the final products start being produced in the labor abundant countries. Later, as in the product cycle theory, the machines themselves may be produced in the developing countries and exported from them.

3.3 Other Empirical Literature

Empirical works on the determinants and growth of exports (other than those reviewed above) have assumed an important part in research over the past decade. However, very few studies have been conducted to explain exports behaviour in South Africa and other developing countries. There are several ways of categorising empirical literature on the growth and determinants of exports. These include categorisation by the type of analysis employed, for example by country analysis, cross section analysis and panel data analysis, and categorisation by countries studied, such as studies of developed countries or developing countries. The latter categorisation is adopted in this review. This section is, therefore, divided into empirical literature from emerging economies, developing and finally narrowed down to empirical literature from South Africa.

3.3.1 Empirical Literature from emerging countries

Catao and Falcetti (2002) focused on the determinants of Argentina's external trade. They identified the extent to which Argentina's rising trade deficit in the 1990s resulted from income and relative price effects, and whether such effects might have been exacerbated by the country's adherence to a fixed exchange rate regime and structural changes in the economy. Aggregate export and import equations were estimated using a considerably broader set of macroeconomic and relative price indicators. Two main set of factors lay behind the widening of Argentina's trade balance during 1991-1998. One was the relatively low growth of the volume of exports, both relative to that of imports as well as relative to the export performance of other fast growing emerging market economies. The bulk of Argentina's exports consisted of raw materials or lightly manufactured primary products. The favourable terms of trade in the first half of the 1990s helped to foster the volume of exports. Argentina's exports appeared to be highly elastic to net aggregate investment and domestic consumption. Argentina's manufacturing exports tend to be highly sensitive to economic activity in Mercosur as well as to the real exchange rate between Argentina and Brazil.

The other main cause of the deterioration of Argentina's trade balance was the high income elasticity of import demand. This rendered the trade balance all the more sensitive to the domestic business cycle, exacerbating the deficit problem.

Cheng (1999) investigated the determinants of export performance of China's Township-Village Enterprise (TVEs). The major sources of data used in the study were from yearbooks of Township and Village Enterprise published by the Ministry of Agriculture. These yearbooks covered the statistics of TVEs on production, employment, wage, expert financial structure and investment aggregate at provincial level. The data contained in these yearbooks were reported by the TVEs across the nation to local government agencies and compiled by the central government. The sample period covers eight years starting from 1987 and ending in 1994. The data collection and cleaning process produced 200 observations that are used in the empirical estimation.

Export performance of domestic firms was a concern for policy makers and economists alike. Existing studies on cross-country comparison have revealed important insights on determinants of exports, particularly the impact of effective exchange rate. However, the results were difficult to compare and interpret due to differences in the institutional and economic policy environments. Cheng's study was based on cross-regional data of China's non–state rural industrial sector, attempts to conduct an analysis of international competitiveness for firms that face a relatively homogenous policy environment.

An analytical model was constructed with a rational economic agent who had to decide the proportion of his products to export and to sell in the domestic market. Cheng found that TVEs' export performance was negatively related to the unit labour cost of TVEs, implying the TVEs with higher labour costs after being adjusted for labour productivity were less competitive in international market. The magnitude of foreign direct investment was found to have a strong impact on the export performance of TVEs. Transaction and transportation costs were found to hinder the export of TVEs. The study was clearly related to the current literature on the export determinants of the newly industrialised economies. The focus was on estimation of the demand elasticity; the research has produced useful insights. The lesson

was that the price elasticity plays a more important role than the income elasticity as previously believed. To complement these findings, they focused on the supply side factors that determine the international competitiveness of China's TVEs.

Faruk and others (2004) estimated the export supply and import demand for the Turkish economy using single equation and vector auto regression frameworks. The models used quarterly data covering the period from 1987:1 to 2003: iv. Data was obtained from the Central Bank of the Republic of Turkey, State Planning Organisation and the State Institute of Statistics. The data consisted of the following items: exports, imports, real domestic output, real GDP and real exchange rate. The study has estimated the real exports of Turkey as an export supply equation. Estimation was carried out in two stages being in parallel with the Engle and Granger's cointegration approach.

The results indicated that imports can be explained to a wider extent by the real exchange rate and the national income and exports were mostly determined by unit labour cost, export prices and national income. In both cases, some recent changes in the overall trend of series were evident and well captured in and reflected on the estimates. Unrestricted vector auto regression models of exports and imports were elaborated on using the same set of regressors. These models yielded similar results as captured by the single equation framework and pointed out a two-quarter horizon for the effects of the real exchange rate on the trade deficit to be realised. Real exchange rate was revealed to be a statistically significant determinant of imports, but not of exports. At the same time, the VAR findings showed that real exchange rate was a determinant of current account which indicated that the effect of the real exchange rate on trade deficit basically worked through the imports.

Duenas-Caparas (2006) investigated the determinants of export performance in the Philippine manufacturing sector. The study analysed the different factors that could affect the export performance of firms in selected Philippine manufacturing industries. The factors identified were basically firm-specific like size, percentage of skilled labour to total labour, training activities, foreign affiliation, R&D activities, capital intensity and firm age. The study was made possible due to the information rich survey conducted by ADB in year 2002. The

selected manufacturing sectors were classified using the Pavitt taxonomy to stress the importance of sectoral variation in determining the influence of these firm-specific factors to export performance. The possible relation between export performance and firm level characteristics was tested using a novel econometric model by Papke and Wooldridge which was specifically developed for fractional response modeling.

The main findings of the study were summarised as follows: the influence of foreign affiliation was similar across all sectors i.e positive and strongly influential in improving a firm's export performance. Research and development activity was highly influential for science based firms and confirmed the belief that it is a necessary ingredient that propelled export propensity. Development of human capital through training strongly influenced export performance for science based sectors. Firm age was an important factor in the export performance of electronics and clothing sectors. A high capital per worker positively influenced the export performance of electronic firms.

Dijk (2002) analysed the export behaviour of Indonesian companies using a unique database covering all manufacturing firms active in 1995. The data used in the research was supplied by the Indonesian Central Bureau of Statistics. The study conducted an industrial survey in which all Indonesian establishments with more than 20 employees were required to fill in a questionnaire covering a wide range of questions on labour, capital and output. Due to the richness of the database Dijk was able to test a range of determinants pointed out by the literature, separately for 28 industries at the three-digit level. The empirical model tested the relationship between the propensity to export as a function of relative firm size, share of skilled labour, research and development, training, unit labour cost and age.

The main findings of the research were summarised as follows: The relationship between relative sizes, the square of relative size, foreign ownership and age and export propensity was similar across industries. The outcomes suggested that the firm size-export relationship is inverted u-shaped. Economies of scale helped firms enter foreign markets but only up to a certain threshold point. The largest firms in an industry were less inclined to export because the enjoyed local market power caused by government regulations and trade barriers. The

influence of skilled labour differs between Pavitt sectors. Dijk found skills to be positively related to exports in supplier dominated firms while the opposite result was obtained for scale intensive firms. No relationship was found for science based and specialized supplier firms.

This result was in contrast with similar studies on export behaviour in developing countries that do not distinguish between industries. They found that skilled labour was negatively related with exports because of cost disadvantages in line with Heckscher-Ohlin theory. Dijk's findings pointed out that differences between industries do matter and, especially in the category of supplier dominated firms, skilled labour was essential to break into foreign markets. Also, the estimates confirmed earlier findings of Kumar and Siddarthan (1994) for India, that R&D in developing countries only benefited exports in relatively mature industries categorised under supplier dominated and scale intensive firms. Many of the determinants which were analysed explain the export behaviour of supplier dominated firms. An important implication of the study was that industries are different and should be considered different when industrial and trade policies are formulated.

The modeling framework was designed to allow the researchers to address the respective roles of size and technical efficiency in exporting from manufacturing firms in Africa in as general framework as possible. The research showed that firm size was a robust determinant of the decision to export. In addition, foreign ownership and skills were found to be significant determinants of exporting.

Ravindra and Kapur (2005) investigated the determinants of exports performance of Indian firms. The study examined the exports performance of firms with the help of balance sheet data of 557 firms for the years 1980-1981 to 1995-1996. The panel was divided into sub periods, 1980-1981 to 1990-1991 and 1991 -1992 to 1995-1996. The dividing line was economic reforms introduced in the Indian economy since 1991-1992. The study used the panel Tobit model and it explained the improved export performance through changes in various firm level variables such as economic environmental factors derived from existing literature on experience of different countries. The study found that the industry level business environmental factors play a very important role in determining the export intensity

of firms. The study also fore grounded certain strategic and policy implications that were relevant for emerging economies from its findings on India.

Chang (2001) analysed the determinants of exports performance and the effects of the WTO entry on labour intensive export using cross section data at the industry level. This empirical work was based on cross-sectional data at the industry level in 'The Data of the Third National Industrial Census of the People's Republic of China (DTNICPRC) 1995'. In DTNICPRC, the entire industry was categorised into 191 sub-sectors, including 19 sub-sectors in mining, 165 sub-sectors in manufacturing and 7 sub-sectors in public utilities. The census was undertaken by the Chinese State Statistic Bureau in 1995, and the data was published in 1997. The data covered all industrial enterprises with an independent accounting system and were the most up-to-date and most detailed data on Chinese industrial sectors. The study applied the two-stage least square test (TSLS). The results suggested that the average wage, representing labour costs, was one of the most important factors determining export performance. The coefficient of Foreign Direct Investment (FDI) was positive and statistically significant, indicating that FDI played a strategic role in promoting exports. Firm size had a positive sign and was statistically significant at the 1% level.

This suggested that the larger the economies of scale, the more a sector would export since there was a trade-off between extra costs of exporting and economies of scale. The finding collaborated with that of Chetty and Hamilton (1993), in which firm size was found to have a positive impact on export performance. The finding also suggests that the new trade theory, which relies on economies of scale, can also be used to explain export performance in China. R&D intensity has a negative sign and was statistically insignificant. This indicated that China's export products contain fewer R&D components and more labour inputs, implying that the country's industries have not established technological competitiveness, and thus R&D intensity appeared less important than other factors in explaining China's exports.

Dennis (2003) identified the key determinants of exports in Finland and considered how determinants of exports impact on household welfare levels focusing on the channels of transmission using a framework provided by Winters *et-al.*, (2002). The study employed a

computable general equilibrium methodology. CGE models are multi sectoral economy wide models specifying behavioural relationships for producers, consumers and other economic agents and how they interact with each other, within a Eurasian economy.

Results produced two broad conclusions: first there was an obvious result that different export promoting measures yielded different effects on welfare levels even if they achieved the same level of export response. The results showed that even though each of these export promoting measures yielded a 1% increase in exports, the welfare impacts from infrastructure and productivity improvements were significantly more favourable than from the tariff liberalisation and exchange rate depreciation. The reason for this was mainly due to the more favourable goods market effect as well as growth and government income channels resulting from the infrastructural and productivity improvements compared with tariff liberalisation and exchange rate depreciation. The second observation of the study was that in all cases where growth in real GDP occurred, welfare was also observed to increase and vice-versa, thus providing further evidence in support of the current prevailing view in the developing literature that growth is necessary for poverty reduction. The study suggested that growth from infrastructure was more superior to that from productivity and both were superior to tariff liberalisation.

3.3.2 Empirical Literature from developing countries

The importance of exports, particularly in developing countries has led to several studies investigating its determinants and growth. These studies include, Sangita (2000), Grenier, McKay and Morrissey (1998), Dennis (2003) and Roberto (2002) among others.

As noted in the last section, Sangita (2000) identified some of the main determinants of exports in Fiji. To better understand factors affecting Fiji's exports, Sangita developed an empirical model of exports for Fiji. The model related the growth in Fiji's exports to a number of variables including trading partner income, the real effective exchange rate and agricultural supply side shocks. The empirical frame was an error correction model. A single equation model for exports was developed in which trading partner income and relative

prices played a central role. The standard approach for specifying and estimating foreign trade equations was the imperfect substitute's model, in which the key assumption was that exports are not perfect substitutes for domestic goods in the importing countries. The empirical specification of the demand function for Fiji exports was based on this model. Thus, the resulting export demand function represented the quantity demanded as a function of the level of income in the importing countries and of relative prices.

The data which was used was largely sourced from various issues of the Current Economic Statistics. Some of the series were constructed from primary data. The degree of integration or stationarity of each individual data series was determined first before estimating the model. Augmented Dickey-Fuller (1984) and the Phillips and Perron (1988) tests were performed on each of the variables, where a unit root null hypothesis was tested against a stationary alternative. Each of the original variables was in logs except the sugar can production per hectare, which was in levels. Real exports, trading partner GDP and the real effective exchange rate series, were stationary in their first difference. The sugar production series was stationary in levels.

Several methods have been adapted to model cointegration relationships for export equations. The cointegrating relationship between export volumes and its explanatory variable was tested and estimated using an unrestricted error correction model (ECM) procedure. The estimation period was from 1968 to 1998. The export model was tested for normality, serial correlation autoregressive conditional heteroskedasticity and stability. Diagnostic tests carried out on the data revealed that the model was reasonably well specified. The findings were consistent with trade theory. The results suggested that trading partner income, the real effective exchange rate and agricultural supply-side shocks account for a substantial part of the evolution of exports in Fiji. In addition, the results suggest both domestic and external shocks largely influence movements in exports.

Grenier, McKay and Morrissey (1998) investigated the determinants of exports and investment of manufacturing firms in Tanzania. Since the mid 1980s, Tanzania implemented a number of trade and fiscal policy reforms that were partly intended to encourage increased

export activity by manufacturing firms. Size, government ownership and investment were all linked to exporting, and all appear to have some independent influence. Large firms export in a larger proportion than "not large" firms which was also the case for parastatals, and for firms that sustain their investment. It was clear that government ownership precedes exporting: while parastatals would have easier access to credit than private firms, they found no evidence of a significant relationship between parastatals and investment. A plausible inference was that parastatals had easier access to exporting channels than other firms, whilst among private firms the relationship between sustained investment and exporting is important. In this regard, there was evidence that firms with sustained investment are more likely to export.

Sustained investment is clearly important for private exporters; hence access to credit was important. Weakness in the banking sector has been a major problem to Tanzanian manufacturers, as few firms reported bank loans as a source of start-up or investment capital. While there have been measures to revitalise the banking sector, venture capital was scarce and access to bank loans remains constrained. Small firms were usually only started and sustained by those with access to personal savings, and so were likely to remain relatively small-scale and could not be expected to become significant exporters. The Tanzania capital market was underdeveloped hence larger firms, and those most likely to be significant exporters, would probably require an injection of funds from foreign sources. Foreign ownership was likely to become an increasingly important feature of Tanzania exporting firms. Government policy failed to instill business confidence in the early 1990s.

Roberto (2002) analysed the determinants of export performance of Chilean manufacturing plants using a more detailed approach than previous studies. Instead of focusing solely on the export decision, the study analysed factors that determine success in the exporting process. The data source for the study was obtained from Chilean government's National Institute of Statistics annual nationwide survey of manufacturing establishments. The data was for the period 1990-1996. The survey collected information of more than 5000 plants every year and included firms with 10 or more employees. One of the main findings of this study was consistent with previous studies. Roberto found significant differences between established

exporter and sporadic exporter firms. The established exporters exhibited greater productivity, size, and human capital and wages than the rest of the firms in the manufacturing industry. In addition, the results suggested that purchases of foreign technical licenses and the participation of foreign capital contribute positively to export performance.

These findings indicated that the traditional approach towards export promotion in developing countries has serious limitations in generating permanent effects on export performance, because this strategy was not designed to improve initial plant conditions, such as productivity and labour skills.

3.3.3 Empirical Literature from South Africa

There are very few studies that have analysed the determinants and growth of exports in South Africa. The few studies that have investigated the determinants of exports include the work of Edwards and Alves (2006), Naude (2000) and Gouws (2005), among others.

Edwards and Alves (2006) presented both a comparative analysis of South Africa's export structure and performance and an econometric investigation of the determinants of export volumes. To investigate the determinants of South African manufacturing export performance, export demand and supply relationships were estimated using a panel of manufacturing industry data covering the period 1970-2002. Edwards and Alves found that improved growth and diversification of South African manufactured exports during the 1990s lag those of East Asia and a few other resource based economies. This performance in part reflects relatively low world growth in resource based products, but factors that affect the profitability of export supply, such as the real effective exchange rate, infrastructure costs, tariff rates and skilled labour, were shown to be important. Export demand and the ability to compete in the export market on the basis of price was not found to be a major constraint to export growth.

Naude (2000) investigated the determinants of South African exports. He used an econometric analysis on his investigation. A general export supply function for South Africa

was estimated. The Augmented Dickey-Fuller test was used to detect the possible existence of unit roots in the variables that enter into the equation. Both the Engle and Granger two-step method and Johansen's multivariate method of testing for cointegration between the variables were applied. The model used quarterly data spanning the period 1974 to 1998. The regression results were surprising in that none of the determinants of exports identified in the literature were found to be significant in explaining South Africa's export volumes over the period 1974 to 1988. The coefficients were, however, generally found to be of the right sign, and the models passed all relevant diagnostic testing for possible violations of the assumptions of the standard OLS model.

The coefficient of determination, R^2 = 0.49, and the standard error of the regression was 0.0065. The coefficients were of the sign predicted by theory. Naude found that, increases in South African GDP, labour productivity and manufacturing output in GDP were positively related to export volumes, while capacity utilisation was negatively related to exports. This is consistent with the notion that South African firms tend to export more when their capacity utilisation declined. A higher import volume was associated with higher exports, consistent with the notion that trade liberalisation will support export production.

Gouws (2005) investigated the determinants of South African exports and he was more concerned with the policy implications. Trade volume was determined by the level of income and relative prices. These were, in turn, determined by the dynamic of each GDP component (investment, consumption, public expenditure, and exports), the price competitiveness of domestic production (influenced by exchange and relative inflation rates), and non-price competitiveness of domestic production (product quality, technological innovativeness design, promotion), the country's attitude toward foreign goods, historical links with certain origin countries and economic integration.

After setting the global and domestic scene, highlighting relevant events and trends that affected trade, the study evaluated international and South Africa's application of classical and new trade theories. From these processes, determinants were identified. Econometric models were applied to test the determinants empirically. Qualitative techniques were also

used to determine specific drivers at a firm level. A model was proposed for specific intervention to assist new exporters enter global markets, and to retain and grow existing exporters. Based on sound economic theory and the empirical findings from these research approaches, policy recommendations were made.

Naude and others (2000) used data from a firm-level survey of 61 manufacturing firms in South Africa to identify the determinants of investment and exports of manufacturing firms in South Africa. The sample was chosen to include a region of South Africa where manufacturing firms were particularly subject to adjustment shocks. These were adjustment shocks relating to incorporation of so called homeland areas into South Africa, and the greater liberalisation of the South African economy. It was deemed necessary to identify the determinants of investment and exports in manufacturing as this sector is vital for growth and job creation and need higher levels of investment than in the past as well as higher exports to be internationally competitive. Since 1994, manufacturing firms in South Africa were subjected to a significant increase in foreign competition following the adoption by the new South African government of an outward oriented trade and industrial strategy. A regression model found that there was some evidence that larger firms were more likely to export than small firms.

Rankin (2001) conducted a survey on the export behaviour of South African manufacturing firms. The South African survey was undertaken in 1999 and covered the years 1997 and 1998 and it was administered in the Johannesburg area and its immediate surrounds. The study surveyed large formal service firms, small, medium and micro enterprise. The data which was obtained was used to examine the characteristics of the firms, the export behaviour and the decision to export. The results found that firms that export have higher average wage costs and produce more output per worker. Also results suggested that firms that export outside of SADC were more efficient than firms that export only to SADC or that do not export at all. Also the following results were found:

- 71% of South African firms export. These firms export on average 18% of their output;

- There are very few specialist exporters. Less than half the firms in the sample export more than 10% of their output;
- More than a quarter of exporters export only to countries in the SADC region;
- SADC was the major market for all sectors and for more than 50% of firms in all sectors except the iron and steel sector and the textiles and garment sector;
- Other major markets include the rest of Africa, Western Europe, Asia and North America, although there are noticeable differences in major markets between sectors;
- Exporting in general does not make a difference to efficiency but exporting out of SADC does. Firms that export outside of SADC produce more output with the same amount of inputs than those that do not.

Matthee and Naude (2007) investigated the question of location of exporters of manufactured goods within a country. Based on insights from new trade theory, the new economic geography and gravity equation modeling, an empirical model was specified wherein agglomeration and increasing returns and transport costs were identified as major determinants of choice of location for exporters. Data used was obtained from 354 magisterial districts in South Africa, with a variety of estimators and allowances for data shortcomings to determine that the home market effect and distance are significant determinants of regional manufactured exports. The contribution of this research was to test for these determinants using developing country data, and to generally contribute to the small literature. The main results of the research was that internal distance and domestic transport costs influence the extent to which different regions in a developing country can be expected to be successful in exporting manufactures.

The results of Matthee and Naude complemented the paper of Nicolini (2003) on the determinants of exports from European regions. It was found that home market effect has a much larger or stronger effect on exports than distance in a developing country setting. In contrast, Nicolini found the effect of the home market effect to be significant but smaller in overall size and the effect of transport or distance to be slightly higher, with sizes of coefficients ranging between 0.7 and 1.3 for the home-market effect (GDP) and -0.36 and -0.58 for distance. Although direct comparisons between the results and that of Nicolini

(2003) for Europe were made difficult due to different estimation methods and different proxies for distance, the overall suggestion was that the home market effect is relatively more important in the developing country context (South Africa) with more imperfectly competitive firms. Also the results were consistent with the theoretical model of Puga (1998) wherein developing countries which urbanise later and with better transport technologies are spatially more concentrated than developed regions.

Naude and Gries (2004) investigated how various sub-national regions in South Africa benefit from rising manufacturing exports since 1994 and also the factors that determined the differential manufacturing export performance of South Africa's sub–national regions. Data on exports of manufactured goods was obtained from the South African Revenue Service and Department of Customs and Excise. Data on the independent variables such as labour, population and skills were obtained from various sources, such as statistics South Africa's 1996 Census and Global Insight Southern Africa's Regional Economic focus. Data on the capital stock of municipalities in 1990 was obtained from Econometrix (Pty) Ltd. Apart from the distance variable and the capital stock of municipalities, the data covers the period 1996 to 2000. Panel data was used, that is cross-section data over time, where cross section units were 354 magisterial districts across South Africa. A panel data estimator was used and in this case it was a Random-Effects (RE) GLS-estimator.

Between 1996 and 2000 South Africa's total exports increased on average by 6.7% per annum. Manufacturing exports increased at an even faster rate of 9.2% per annum over this period. As a result, the share of manufacturing in total exports increased from 67.5% in 1996 to 73% in 2000. Whilst the increase in manufacturing exports was good for the overall South African economy, it was not apparent that it has been equally good for every sub-national region within the country. In 2000 just 22 magisterial districts generated 84% of South Africa's total exports of manufactures. Results supported the findings elsewhere in the literature that geography influences export performance. Transport costs due to distance from ports were found to have a significant negative effect on exports. The magisterial districts in South Africa, which are large in terms of economic size benefited most from the outward orientation of the South African economy.

Harmse, Kanfer and Schei (2005) investigated the determinants of South Africa-US Intra-Industry Trade in Services. The study empirically identified factors that determine South Africa-Us intra-industry trade in selected services during the period 1994-2003. The study utilised the goods based model of intra-industry trade. This was predicted based on the fact that the existing data did not separate the different models of supply of services. Using an estimation methodology that was robust to heteroscedasticity and serial correlation, the study showed that South Africa-US intra-industry trade in services was determined by factors similar to goods based North-South intra-industry trade. Specifically, intra-industry trade was determined by differences in per capita income, market size, multinational activities abroad and degree of economic freedom in South Africa. One important policy implication that emerged from the study was that South Africa could increase her intra-industry trade in unaffiliated services by minimizing the differences with the US in income per capita, market size, FDI and degree of market openness.

3.4 General Assessment of the Literature

The most notable theories that explain forces behind international trade include Ricardo's and the H-O theory which are based on the static comparative advantage assumptions. The traditional trade models fail to explain the existence of trade in similar products which accounts for the dominant share of total world trade particularly between developed economies. Another problem with these models is that they fail to explain dynamic comparative advantage, which is the changing comparative advantage of countries over time. Ricardo's theory is not a close approximation to reality because he assumed labour as the only factor of production and that technology is exogenous. Due to the limitations of the Ricardian comparative advantage, the H-O theory is regarded as the more sophisticated because it considered capital as a factor of production. However, the H-O theory has its own short comings in the sense that it assumed that production is characterised by constant returns to scale and that perfect competition exists in both countries. In reality, markets are imperfect and industries assume increasing returns to scale. According to Wood and Mayer (1998), the Heckscher-Ohlin theory cannot provide a complete explanation of trade patterns because it

neglects to consider economies of scale, sectorial differences in efficiency, imperfect competition, government policies and transport costs.

In response to the short comings of the H-O theory, trade can also be explained through the theories such as increasing returns to scale, dynamic comparative advantage and technological competition. In addition, many economists consider R&D and natural resources among the possible determinants of the sources of trade. We can say that the results of research on the determinants and growth of exports vary depending on the models used, data and countries. Empirical literature does not provide a theoretical framework to follow. Very few studies have analysed the determinants and growth of exports in South Africa. Empirical literature does not provide a theoretical framework to follow. Thus, the debate on the determinants and growth of exports is still ongoing and it is still inconclusive. Thus research in this area is warranted.

Table 3.1 summarises the empirical literature and provides a quick check list for selecting variables to be tested in empirical analysis.

Table 3.1 Summary of selected empirical literature on the determinants of exports

Study	Countries	Methodology	Determinants
Naude (2000)	South Africa	Multivariate cointegration	GDP, labour productivity, capacity utilization, exchange rate
Sangita (200)	Fiji	Error correction model	Trading partner income, real effective exchange rate, trading partner GDP, Agriculture supply side shocks
Faruk and others (2004)	Turkey	Cointegration	Real GDP, real exchange rate, real domestic output, imports, labour cost, exports prices and national income
Cheng (1999)	China	Ordinary Least Square	Unit labour cost, foreign direct investment, transportation cost
Dijk (2002)	Indonesia	Survey	Firm size, share of skilled labour, research and development, training, unit labour cost and age
Duenas-Caparas (2006)	Philippine	Classical Regression	Firm size, percentage of skilled labour to total labour, training activities, foreign affiliation, R&D capital intensity and firm age
Grenier and others (1998)	Tanzania	Survey	Firm size, government ownership and investment

3.5 Conclusion

The main objective of this chapter has been to investigate the potential determinants of exports. There are several theoretical models of the determination of exports. Most of the theories predict that countries will specialise in products in which they have a comparative advantage, whether this has been acquired or not. Countries need to exploit their comparative advantage in order to maximise their welfare. Trade occurs only when at least one of the parties improves their position. How they perceive the improved position will depend on how they see their value improving. Ricardo showed how labour could be used to create value. In comparison, the Heckscher-Ohlin model instead, showed how factor endowments form the basis for trade. The traditional trade models fail to explain the existences of trade in similar products, which accounts for the dominant share of total world trade particularly between developed economies. This led to the development of new trade theories that looked at various demand factors, market structures, externalities and economies of scale.

It is very difficult to summarise literature on the determinants of exports. Previous researchers have empirically estimated these fundamental models, but have only selected variables that suit their different situations. However, it is self defeating to come away from the vast literature covered in this chapter without more than a feeling that the main determinants of exports in developing countries include changes in the terms of trade, labour productivity, capacity utilisation, exchange rate, trading partner income, real effective, trading partner GDP, and agriculture supply side shocks.

Chapter four

Research Methodology

4.1 Introduction

The review of literature on the determinants of exports and an overview of the South African exports, have both shed some light on the linkage between the exports and its potential determinants. This chapter develops an export model and estimation techniques of both the export supply and export demand. The purpose of the chapter is to specify the determinants of South African exports and identify data to be used in the model. The chapter is divided into five sections. Section 4.2 develops a model that links exports to its potential determinants and includes the definition of variables. Data sources follow in section 4.3. A review of estimation techniques for the study of determinants of exports are presented in section 4.4, while section 4.5 concludes the chapter.

4.2 Model specification and definition of variables

The study uses a variant of the imperfect substitution model outlined in Goldstein and Khan (1985) as discussed further in Edwards and Wilcox (2003) and Edwards and Alves (2006) to investigate the major determinants of exports in South Africa. This model is represented as a system of equations for export supply (X^s) and export demand (X^d) which simultaneously determines the export price and the export quantity.

In this study the export demand will be modeled as a function of real exchange rate, real foreign income and domestic price of exports. This can be expressed as follows:

$$EX^d = \alpha_0 + \beta_1 REER_t + \beta_2 Y_t + \beta_3 DP_t + \mu_i \quad \text{.....(4.1)}$$

In order to avoid any misinterpretation of empirical results, this section provides the description of all variables appearing in the estimated equations. All the variables are

converted to logarithms for the obvious reasons of obtaining elasticity coefficients on these variables and minimising the impact of outliers. The model is thus of the form:

$$lEX^{d} = \alpha_0 + \beta_1 lREER_t + \beta_2 lY_t + \beta_3 lDP_t + \mu_i \quad \text{.....(4.1.1)}$$

Where:

LEX^{d} = is the logarithm of goods and services that are produced domestically and sold to buyers in another country.

LREER = is the logarithm of the real effective exchange rate of the rand, measured in foreign currency terms (index 2000-100). Thus an increase in this variable indicates an appreciation of the rand. The real effective exchange rate $REER_i$ for country *i* is normally calculated as a geometric weighted average of bilateral real exchange rates:

$$REER_i = \prod_{i \neq j} \left(\frac{p_i e_{i1}}{p_j e_{j1}} \right) x_{ij}$$

where e_j denotes the exchange value of country *j*'s currency against the US dollar, x_{ij} is country *j*'s weight in country *i*'s index, and p_j is the price index of country *j*. Under this definition, a rise in REER represents a real appreciation of the domestic currency.

LDP = is the logarithm of the price at which a commodity trades with a country in contrast to the world price. In other words it is the ratio of domestic prices to world prices. The domestic price is determined by supply and demand.

LY = Foreign income is defined as income arising from a source outside South Africa which is chargeable under or by virtue of a list of provisions, such as trading income. This variable is proxied by index of real GDP for the industrialised countries. In this study GDP for US is used (2000=100).

μ_i = is an error term.

We postulate the following adjustment mechanism for exports:

$$lX_t - lX_{t-1} = \delta(lX^d{}_t - lX_{t-1}) \quad \text{.....(4.1.2)}$$

where, δ = coefficient of adjustment (0<δ<1). By substituting equation (4.1.1) into equation (4.1.2) the following model is derived:

$$lEX^d{}_t = \alpha_0 + \beta_1 lREER_t + \beta_2 lY_t + \beta_3 lDP_t + (1-\delta)X_{t-1} + \mu_t \quad \text{.....(4.1.3)}$$

On the supply side the desired level of exports are assumed to be influenced by the real exchange rate (REER), price of other inputs apart from labour (PI), and capacity factors (CU). This can be expressed as follows:

$$EX^s = \alpha_0 + \beta_1 REER + \beta_2 PI_t + \beta_3 CU_t + \mu_i \quad \text{.....(4.2)}$$

In log linear form the function becomes

$$LEX^s = \alpha_0 + \beta_1 lREER_t + \beta_2 lPI_t + \beta_3 lCU_t + \mu_i \quad \text{.....(4.2.1)}$$

where:

LEX^s= is the logarithm of exportables.

LPI = Price of other inputs apart from labour (the proportion of manufacturing production in total output).

LCU = is the capacity utilisation (infrastructure and the level of technology, gross domestic product (GDP) and trade openness).

This specification assumes that the desired level of exports supplied is equal to the level of exports supplied. To get a disequilibrium export supply function, a partial adjustment mechanism is needed. We postulate the following adjustment mechanism for exports.

$$\Delta lX_t = \lambda(lX_t - lX_{t-1}) \quad \text{.....(4.2.2)}$$

where, λ = coefficient of adjustment (0<λ<1). By substituting equation (4.2.1) into equation (4.2.2), the following model is derived:

$$LEX_t = \alpha_0 + \beta_1 lREER_t + \beta_2 lPI_t + \beta_3 lCU_t + (1-\lambda)lX_{t-1} + \lambda\mu_t \quad \text{.....(4.2.3)}$$

By substituting equation (4.1.3) into equation (4.2.3), the general export function for South Africa is derived as follows:

$$LEX_t = \alpha_0 + \beta_1 lREER_t + \beta_2 lY_t + \beta_3 lPI_t + \beta_4 lCU_t + \beta_5 lDP_t + \mu_i \quad \text{.....(4.3)}$$

This will give us potentially important relationships among expected determinants and trade growth on which the estimation will apply.

We present a summary of the impact of each of these variables on exports in order to define equation (4.3). The impact of real exchange rate (REER) on exports is negative. An increase in exchange rate indicates an appreciation of the rand thereby resulting in a decrease in exports. Thus, a negative sign is therefore expected for the coefficient of exchange rate. A real depreciation of the exchange rate positively affects exports. Sangita (2000) suggested that exchange rate depreciation will promote export volumes. An increase in foreign income will lead to an increase in exports and therefore the coefficient for foreign income is expected to have a positive sign.

The anticipated sign on domestic exports is positive. A higher price for exports raises profitability absolutely. Lower domestic prices and high input costs make selling

domestically less attractive, so they promote export supply. The expected sign on domestic price is positive and this is supported by economic theory. Production capacity or capacity utilisation affects the export supply function in various ways. Higher GDP in foreign countries leads to higher demand in those countries. A foreign country can choose between the exporter's products, the foreign country's domestically produced alternatives and other countries' exports. The higher a country's production capacity, the higher is its export supply (Goldstein and Khan, 1985). This is supported by literature hence Naude (2002) found that increases in South African GDP, labour productivity and manufacturing output in GDP were positively related to export volumes, while capacity utilisation was negatively related to exports.

4.3 Data sources

All the data were obtained from the International Financial Statistics (IFS) published by the International Monetary Fund (IMF). The data are annually and cover the period from 1980 to 2006. The period gives a clear trend of what happened during the apartheid era and after apartheid when trade reforms such as trade liberalisation were implemented. In addition, 1980 to 2006 produces enough observations to run a regression model. The study used time series data and proxies had to have been found for variables without time series data.

4.4 A review of estimation techniques for the study of determinants of exports

There are several techniques available for parameter estimation. These range from classical regression methods to cointegration based techniques. The former is based on the assumption that all the variables to be included in a regression are stationary. Most economic series are not stationary in their levels such that estimations based on this technique will be meaningless. Determining whether a series is stationary or otherwise is very important as it can strongly influence its behaviour and properties. Thus, this section is going to review the techniques employed to test for stationarity and cointegration.

4.4.1 Testing for stationarity / Unit root

According to Brooks (2002, pg. 367), a stationary series can be defined as one with a constant mean, constant variance and constant auto covariance for each given lag. The stationarity or otherwise of a series can strongly influence its behaviour and properties. If a series is non stationary it must be differenced *d* times before it becomes stationary, then it is said to be integrated of order *d*. This would be written as I (*d*). Applying the difference operator more than *d* times to an I(*d*) process will still result in a stationary series (but with an MA error structure). An *I (0)* series is a stationary series, while an *I (1*) series contains one unit root. An *I (2)* series contains two unit roots and so would require differencing twice to induce stationarity. *I (1)* and *I(2*) series can wander a long way from their mean value and cross this mean value rarely, while *I(0)* series should cross the mean frequently.

A series that is not stationary is referred to as non stationary. A nonstationary time series will have a time varying mean or a time varying variance or both. The use of nonstationary data can lead to dangers of running nonsense or spurious regression. If two stationary variables are generated as independent random series, when one of those variables is regressed on the other, the t-ratio on the slope coefficient would be expected not to be significantly different from zero, and the value of R^2 would be expected to be very low.

Classical regression models deal with relationships between stationary variables however; most of the economic indicators usually follow a non-stationary trend. Brooks (2002, pg. 368) show that if two independent sets of non stationary variables *y* and *x* were generated with sample size 500, one regressed on the other and the R^2 noted. The expected R^2 values for each regression should be close to zero; hence the explanatory variables in each case are independent of one another. If nonstationary variables are employed in a regression, then the standard assumptions for asymptotic analysis will not be valid. Thus, the usual t-ratios will not follow a t-distribution and the F-statistic will not follow an F-distribution.

Because of spurious and or nonsense regression, unit root or stationarity tests should be done on all the variables before estimating the parameters and testing for co integration. There are

various tests of stationarity, among others, the graphical analysis and the correlogram tests. In this study we are going to discuss one unit root test (Augmented Dickey-Fuller).

4.4.2 Dickey–Fuller and the Augmented Dickey–Fuller test

A test of stationarity that has become widely popular over the past several years is the unit root test. The early and pioneering work on testing for a unit root in time series was done by Dickey and Fuller (1979 and 1976 respectively). The basic objective of the test is to examine the null hypothesis that ϕ =1 in.

$$y_t = \phi y_{t-1} + u_t \quad \text{.....(4.4)}$$

Thus the hypotheses of interest are:

H_0: Series contains a unit root

H_1: Series is stationary.

In practice, the models under the null (H_0) and alternative (H_1) hypotheses in the three cases are as follows:

- When there is a test for a random walk against a stationary autoregressive process of order one AR(1)
- When there is a test for a random walk against a stationary AR (1) with drift.
- When there is a test for a random walk against a stationary AR (1) with drift and a deterministic time trend.

The Dickey Fuller test employed the following equation for ease of computation and interpretation:

$$\Delta y_t = \beta_1 + \beta_{2t}\psi y_{t-1} + u_t \quad \text{.....(4.5)}$$

In equation (4.3) y_t is the relevant time series, Δ is a first difference operator, t is a linear trend and u_t is the error term. The error term should satisfy the assumptions of normality, constant error variance and independent error terms. If the error terms are not independent in equation (4.3), results based on the Dickey-fuller tests will be biased (Takaendesa, 2006). The Dickey Fuller test is valid only if u_t is assumed not be auto correlated, but would be so if there was autocorrelation in the dependent variable of the regression (Δy_t). The test would thus be 'oversized', meaning that the true size of the test would be higher than the nominal size used. The solution to this shortfall is to use the Augmented Dickey-Fuller (ADF). The ADF augments the test by using lags to the dependent variable. The alternative model in the ADF case can be written as:

$$\Delta y_t = \beta_1 + \beta_{2t} + \psi y_{t-1} + \sum_{i-1}^{p} \propto i \Delta y_{t-i} + u_t \quad \text{.....(4.6)}$$

The lags of Δy_t now 'soak up' any dynamic structure present in the dependent variable, to ensure that u_t is not auto correlated. Equations (4.3) and (4.4) can be estimated without including a trend term and without a constant. The test is conducted on ψ, and the same critical values from the Dickey Fuller tables are used. The null hypothesis of a unit root is rejected in favour of the stationary alternative; in each case the test statistic is more negative than the critical value. In other words, the more negative it is, the stronger the rejection of the hypothesis that there is a unit root at some level of confidence.

The Dickey-Fuller test, as with any other unit root tests, has its own weaknesses. Gujarati (2002, pg. 819) states that most tests of the Dickey –Fuller type have low power, that is, they tend to accept the null of unit root more frequently than is warranted. Therefore, these may find a unit root even when none exists. Power depends on the time span of the data more than mere size of the sample. In addition, the Dickey-Fuller test is weak in its ability to detect a false null hypothesis.

4.4.3 Cointegration and vector error correction modelling (VECM)

The purpose of cointegration tests is to determine whether the variables in our exports model are cointegrated or not. Gujarati (2002, pg. 830) suggest that cointegration of two or more times series suggest that there is a long-run or equilibrium relationship between them. The economic interpretation of cointegration is that if two or more series are linked to form an equilibrium relationship spanning the long- run, then even though the series themselves may be non-stationary, they will move closely together over time and their difference will be stationary. Their long-run relationship is the equilibrium to which the system converges over time, and the disturbance term can be interpreted as the disequilibrium error or the distance that the system is away from equilibrium at time *t*.

A set of variables is defined as cointegrated if a linear combination of them is stationary. In other words, a cointegrating relationship may also be seen as a long-term or equilibrium phenomenon, since it is possible that cointegating variables may deviate from their relationship in the short run, but their association would return in the long run. There are several ways of testing for cointegration, among others; there is the Engle-Granger approach which is residual based and the Johansen and Julius technique which is based on maximum likelihood estimation on a VAR system; however the majority of these techniques have numerous problems when applied to multivariate models.

Engle and Granger (1987) proposed a four step procedure to determine if two *I (1)* variables are cointegrated of order *(1, 1)*. The first step is to pretest the variables for their order of integration. Cointegration necessitates that two variables be integrated of the same order. Thus, the first step in the analysis is to pretest each variable to determine its order of integration. The second step is to estimate the long run equilibrium relationship.

The null hypothesis applied to the residuals states that there is a unit root in the potentially cointegrating regression, while under the alternative, the residuals are stationary. If the null of a unit root in the potentially cointegrating regression's residuals is rejected, it would be concluded that a stationary linear combination of the non-stationary variables have been found. Thus the variables would be classified as cointegrated. If the null hypothesis is not

rejected it means that there is no cointegration. The third step is to estimate the error-correction model. If the variables are cointegrated, the residuals from the equilibrium regression can be used to estimate the error-correction model. The last step is to assess model adequacy.

The Engle-Granger method suffers from a number of problems and these are follows: It is not possible to perform any cointegration test if there are multiple cointegrating relationships and usual finite sample problems of a lack of in unit root and cointegration tests. In addition, there could be a simultaneous equations bias if the causality between y and x runs in both directions, but this single equation approach requires the researcher to normalise on one variable, that is, to specify one variable as the dependent variable and the others as independent variables. The researcher is forced to treat y and x asymmetrically, even though there may have been no theoretical reason for doing so. With Engle-Granger it is not possible to perform any hypothesis tests about the actual cointegrating relationship.

The solution to this shortfall is to use a systems approach to cointegration, which will allow determination of all cointegrating relationships. One such approach is the Johansen technique. This approach is preferred as it captures the underlying time series properties of the data and is a systems equation test that provides estimates of all cointegrating relationships that may exist within a vector of nonstationary variables or a mixture of stationary and nonstationary variables.

In this study we are going to use the vector autoregressive (VAR) based cointegration tests using the methodology developed by Johansen (1991, 1995) because it has several advantages over other cointegration based techniques. Johansen technique has the existence of more than one cointegrating vectors which is allowed for with two tests to help to establish the number of cointegrating vectors. Similarly, once the number of cointegrating relationships has been established, a series of likelihood-ratio tests can be performed to test different hypotheses about them. Johansen technique which is based on full system estimation has greater power and can help to eliminate simultaneous-equation bias and raise efficiency relative to single equation methods.

4.4.4 Johansen technique based on VARS

The Johansen (1995) test for cointegration will be applied in this study because the maximum likelihood framework involved is known to offer better properties than the traditional Engle and Granger approach which is residual based. The following steps are used when implementing the Johansen procedure:

(1) Step 1: Testing the order of integration

The first step in the Johansen approach is to test for the order of integration of the variables under examination. All variables are preset to assess their order of integration. When all the variables are integrated of the same order we can then proceed with the cointegration test. The data must be plotted to see if a linear time trend is present.

(2) Step 2: Setting the appropriate lag length of the model

Estimate the model and determine the rank of Π

(3) Step 3: Choosing the appropriate model regarding the deterministic components in the multivariate system

Analyse the normalised cointegrating vector(s) and speed of adjustment coefficients.

(4) Step 4: Determine the number of cointegrating vectors

Apply causality tests on the error correction model to identify a structural model and determine whether the estimated model is reasonable.

Assuming a set of variables [LEX, LREER, LDP, LCU] that are in I (1) are thought to be cointegrated. A VAR with k lags containing these variables could be set up as:

$$y_t = \beta y_{t-1} + \beta_2 y_{t-2} + ... + \beta_k y_{t-k} + u_t \quad \text{.....(4.7)}$$

In order to use the Johansen test, the VAR needs to be turned into a vector error correction model (VECM) y_t of the form

$$\Delta y_t = \Gamma_1 \Delta y_{t-1} + ... + \Gamma_{k-1} \Delta y_{t-k+1} \Pi y_{t-k} + \Psi D_t + u + \varepsilon_t, t = 1,....T .....(4.8)$$

where D_t are deterministic variables such as dummies and μ is vector of constants. The hypothesis of reduced rank, *r*, of the long-term impact matrix Π = αβ' is then used to formulate the hypothesis of cointegration. Where α represents the speed of adjustment matrix, indicating the speed with which the system responds to last period's deviations from the equilibrium relationship and β is a matrix of long run coefficients. Estimates of β are found by solving the eigenvalue problem so that the eigenvectors corresponding to the *r* largest eigenvalues form the estimated β matrix. The size of the eigenvalues provides a measure of how large the correlation between the cointegrating relationship and the stationary part of the model is. The next step is to establish how many cointegrating vectors exist for each of the relationships. Two test statistic are employed, the λ_{max} statistic and the λ_{trace} statistic. The λ_{max} statistic is of the form:

$$\lambda_{\max} = -TIn(1 - \lambda_{s+1}) .....(4.9)$$

where *T* is the sample size, the λ's are the eigenvalues (ordered in descending order), r is the number of cointegrating vectors (which lies between zero and *p*) *p* is full rank and s is the hypothesized number of cointegrating vectors. The λ_{max} statistic tests the null hypothesis of *r* =*s* cointegrating vectors against the alternative that *r = s+1*. The λ_{trace} statistic is as follows:

$$\lambda_{trace} = -T \sum_{i=s+1}^{p} In(1 - \lambda i) .....(4.10)$$

It tests the null hypothesis that there are r-s cointegrating vectors against the alternative that r≥s+1. Johansen and Juselius (1990) provide critical values for the statistics. The distribution of the test statistic is non-standard, and the critical value depends on the value of r-s, the number of non-stationary components and whether constants are included in each of the

equations. In each case, the null hypothesis is rejected if the test statistic is greater than the critical value.

4.5 Error correction model

If it is established that the relevant variables are cointegrated it is appropriate to estimate an error correction model. In an error-correction model, the short-term dynamics of the variables in the system are influenced by the deviation from equilibrium:

$$\Delta yt = \beta_1 \Delta xt + \beta_2 (y_{t-1} - \gamma_{xt-1}) + \mu t \quad \text{.....(4.11)}$$

The error correction term is given by $y_{t-1} - \gamma_{xt-1}$. The implied coefficient on x_{t-1} of one in this term suggests a proportional long run relationship between *y* and *x*. Error correction models are interpreted as: y is purported to change between *t-1* and t as a result of changes in the values of the explanatory variables *x* between *t-1* and *t*, and also in part to correct for any disequilibrium that existed during the previous period. The error correction term would appear without any lag for this would imply that *y* changes between *t-1* and *t* in response to a disequilibrium at time *t*. γ defines the long run relationship between *x* and *y* while β_1 describes the short run relationship between changes in *x* and changes in *y*. β_2 describes the speed of adjustment back to equilibrium, and its strict definition is that it measures the proportion of last period's equilibrium error that is corrected for.

4.5.1 Advantages of the ECM

The ECM is important for many reasons such as that it is a convenient model measuring the correction from disequilibrium of the previous period which has a very good economic implication. In addition, ECMs are formulated in terms of first differences which typically eliminate trends from the variables involved; they resolve the problem of spurious regressions. The other advantage of ECMs is the ease with which they can fit into the general-to-specific approach to econometric modeling, which is in fact a search for the most parsimonious ECM model that best fits given data sets. Lastly, the fact that the

disequilibrium error term is stationary because the ECM has important implications such as: the fact that the two variables are cointegrated implies that there is some adjustment process which prevents the errors in the long-run relationship becoming larger and larger.

4.6 Diagnostic checks

This stage is crucial in the analysis of the determinants of exports because it validates the parameter estimation outcomes achieved by the estimated model. Diagnostic checks test the stochastic properties of the model such as residual autocorrelation, heteroskedasticity and normality, among others. The multivariate extensions of the residuals tests just mentioned will be applied in this study; therefore, they are briefly discussed here.

4.6.1 Heteroscedasticity

According to Brooks (2002, pg. 148), there are a number of formal statistical tests for heteroscedasticity. One such popular test is the White's (1980) general test for heteroscedasticity. The test is useful because it has a number of assumptions such as that it assumes that the regression model estimated is of the standard linear. After running the regression residuals are obtained and then test regression is run by regressing each product of the residuals on the cross products of the regressors and testing the joint significance of the regression. The null hypothesis for the White test is homoskedasticity and if we fail to reject the null hypothesis then we have homoskedasticity. If we reject the null hypothesis, then we have heteroskedasticity.

4.6.2 Residual normality test

One of the most commonly applied tests for normality is the Bera-Jarque (BJ) test. The BJ uses the property of a normally distributed random variable that the entire distribution is characterised by the first two moments- the mean and the variance. The Bera-Jarque test statistic asymptotically follows a X^2 under the null hypothesis that the distribution of the series is symmetric. The null hypothesis of normality would be rejected if the residuals from the model are either significantly skewed or leptokurtic/ platykurtic (or both).

4.6.3 Autocorrelation LM tests

Lagrange Multiplier (LM) test centers on the value of the R^2 for the auxiliary regression. If one or more coefficients in an equation are statistically significant, then the value of R^2 for that equation will be relatively significant, while if none of the variables is significant, R^2 will be relatively low. The LM test operates by obtaining R^2 from the auxiliary regression and multiplying it by the number of observations, T. It can be shown as:

$$TR^2 \approx \chi^2(m)$$

where m is the number of regressors in the auxiliary regression (excluding the constant term), equivalent to the number of restrictions that would have to be placed under the F-tests approach.

4.7 Conclusion

In this chapter, based on theory, the potential determinants for exports in South Africa were specified. The potential determinants of exports included among others, real effective exchange rate, domestic price of exports, foreign income, capacity utilisation as a proxy variable for trade openness and the price of inputs apart from labour. The model employed the Dickey–Fuller and the Augmented–Dickey Fuller for unit root test. The Johansen (1991.1995) cointegration technique was employed because of its several advantages over other techniques such as the Engle-Granger. A number of diagnostic checks will be done including among others, residual normality test, heteroskedacity, autocorrelation Lagrange Multiplier to see whether the residual passes all these diagnostic checks.

Chapter five

Presentation and analysis of empirical findings

5.1 Introduction

The results presented in this chapter provide answers to the questions which were raised in chapter one of this study. What are the long run fundamental determinants of exports in South Africa? What is the significance of factors such as exchange rate, real foreign income and the relative prices of exports affecting exports in South Africa? This chapter presents results of the unit root tests and the graphical analysis for the variables in the model. Cointegration test among the variables will be done with a view to establish the long run relationship. The error correction models are thereafter estimated. The next section presents the empirical findings, while the last section concludes this chapter.

5.2 Empirical Findings

This section is divided into four sub-sections. The first section presents the results of stationarity/ unit root tests, the second presents and discusses the cointegtation test results; the third section discusses the long run relationship of the export model.

5.2.1 Unit root/ stationarity test results

The first step in the procedure is to test whether the time series are stationary. In this study, one informal test for stationarity and two formal tests are employed. One of the most popular informal tests for stationarity is the graphical analysis of the series. A visual plot of the series is usually the first step in the analysis of any time series before pursuing any formal tests. Augmented Dickey-Fuller (ADF) tests (Dickey and Fuller 1981) are employed to identify the order of integration (that is the number of times a variable needs to be differenced to make it stationary. The graphical examination of the series is very important before any form of analysis. This graphical examination allows for detection of any data capturing errors, and checking of structural breaks or drifts that may bias the unit root tests. It allows us to have an

idea of the stationarity of the data. Figure 5.1 shows plots of all variables used in the model in their logarithm form and first differences against time.

The first impression that we get from the plots in figure 5.1 is that virtually all the variables in their levels have a time variant mean and variance suggesting that they are not stationary. The conclusion of non-stationarity is arrived at after observing that none of the graphs fluctuate around a zero mean, an indication of stationarity. DLREER and DLGDP for US clearly follow a stationary process (white noise process), as they move closely around its mean.

DLEXPORTS and DLTRADE OP could be stationary or closer to the stationary boundary, as they also seem to be hovering around the means but their variances are clearly not constant over time. The problem with the visual inspection technique is that the approach is very subjective. The graphical analysis serves as a bench mark for the formal measure of unit root, thereby with graphical analysis alone we cannot be sure about the stationarity status of the variables especially those that do follow a clear trend in this study. Therefore, what is required here is some kind of formal hypothesis testing.

Figure 5.1 Plots of the exports and its potential determinants 1980-2006

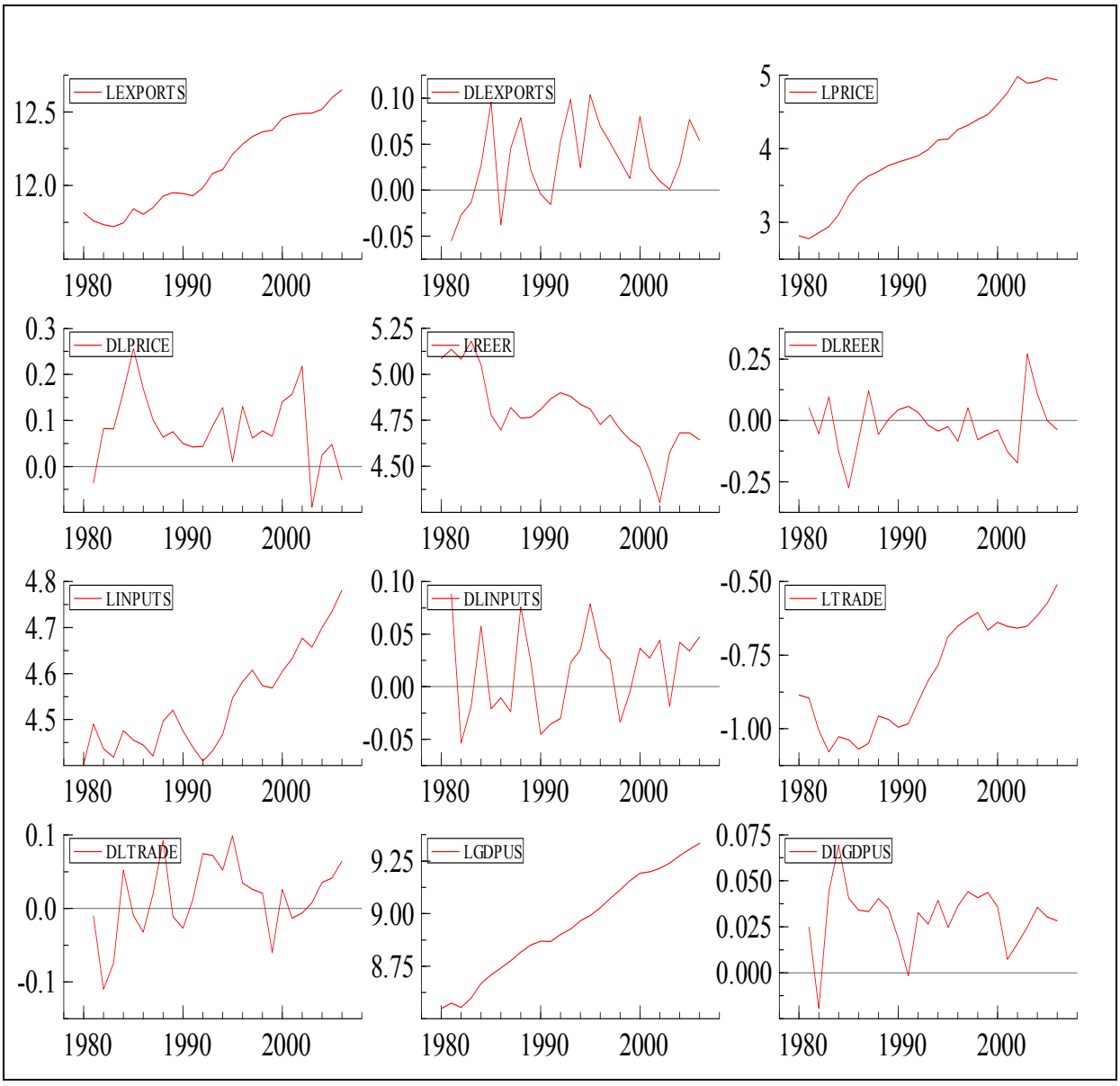


Table 5.1 Unit root/stationarity tests

		Dickey Fuller			Augmented Dickey Fuller		
Order of Integration	Variable	No constant& Trend	Constant no trend	Constant & trend	Constant no trend	No constant& Trend	Constant & trend
Level	LEXPO	3.826	1.063	-3.657*	3.048	0.42.5	-2.997
1stDiff	DLEXPO	-2.812**	-4.418**	-4.459**	-1.838	-3.787**	-3.771*
Level	LEXPPRI	4.845	-1.266	-1.239	2.232	-2.003	-2.132
1stDiff	DLEXPRI	-2.14*	-3.8**	-4.145*	-1.457	-2.592	-3.014
Level	LREER	-0.879	-1.705	-2.223	-0.898	-2.152	-2.971
1stDiff	DLREER	-4.35**	-4.393**	-4.393**	-4.045**	-4.125**	-4.144*
Level	LTROP	-1.206	-0.4383	-2.618	-1.937	-1.393	0.888
1st	DLTROP	-5.133**	-5.658**	-5.469**	-2.981**	-3.68*	-3.676*
1st	DGDP US	-6.949**	-6.797**	-6.655**	-5.024**	-4.982**	-5.094**
Level	LINPUT PRIC	1.838	0.830	-1.598	1.36	0.555	-2.241
1st	DLINPUT PR	-4.636**	-4.898**	-5.361**	-3.162**	-3.328*	-4.037*
5%	Critical	-1.955	-2.98	-3.594	-1.955	-2.985	-3.603
1%	Values	-2.656	-3.708	-4.355	-2.66	-3.72	-4.374

* represents a stationary variable at 5% level of significance

** represents a stationary variable at 1% level of significance

L represents Logarithms of variables

D represents that the variable has been differenced

It should be noted that both DF and ADF tests test the null hypothesis of a unit root. The null hypothesis of a unit root is rejected in favour of the stationary alternative in each case if the test statistic is more negative than the critical value. Therefore, a rejection of the null hypothesis means that the series do not have a unit root. It should also be noted that, the results were carried out with no constant and trend, with constant but no trend, with both trend and constant. The unit root using constant and trend suggests that all series become stationary after first differencing. The only exception is for some of the variables under the ADF.

The results for DF tests in Table 5.1 show that the log of exports is only stationary in levels where there is a constant and a trend. Since ADF is stricter than the DF, the log of exports is non stationary in levels. When the test for exports is applied to first differencing, DLEXPO becomes stationary under the DF test.

GDPUS is not stationary in levels; however, it becomes stationary in its first differences for both the Dickey fuller and the Augmented Dickey fuller tests. The log of real effective exchange rate (LREER) is not stationary in levels, however, it becomes stationary after first differences and we can therefore conclude that REER is integrated to order 1(1). Trade openness, which is one of the measures of capacity utilization, is not stationary in levels, however becomes stationary after first differencing for both tests. The log of exports price (LEXPR) is not stationary in levels; however it becomes stationary after being differenced once. The price of inputs is not stationary in levels; however, it becomes stationary after first differencing.

It appears that the results from both the ADF and DF are more in line with those from the graphical analysis. We conclude therefore that all of the series are first difference stationary I (1), thus the variables are integrated of the same order, so we carry all the variables forward to cointegration tests.

5.2.2 Cointegration

Once it has been established that the variables are integrated of the same order, the next step is to determine whether there exists a long-run equilibrium relationship amongst them. Cointegration

describes the existence of an equilibrium or stationarity relationship among two or more times series each of which is individually nonstationary. The advantage of the cointegration approach is that it allows one to integrate the long-run and short-run relationship between variables within a unified framework. Two conditions must be met for two or more variables to be cointegrated. First, they must be integrated of the same order. Secondly, linear combinations of the variables from the regression of the non stationary variables (in levels form) must be stationary. In this study, we use the Johansen's (Johansen 1988; Johansen and Juselius 1990) maximum likelihood approach to test for cointegration. This approach has been shown to be superior to Engle and Granger's (1987) residual-based approach. Among other things, the Johansen approach is capable of detecting multiple cointegrating relationships.

Table 5.2 reports the results of the cointegration test, as well as the lag length chosen. If the null hypothesis of at most zero cointegrating relation is rejected in favour of at most one cointegrating relationship, then in the next step the null hypothesis of at most one cointegrating relationship is tested against the alternative of at most two cointegrating relationships, and so on. Therefore if p is the number of variables (exports, real effective exchange rate) and r is the rank (number of cointegrating equations), then the trace tests the hypothesis that $r \leq p$ against the alternative. The null hypothesis fails to be rejected when the test statistic is smaller than the trace test's critical values. The maximum eigenvalue test tests the null of r cointegrating equation against the alternative of $r + 1$ cointegrating equations. The null hypothesis fails to be rejected when the test statistic is smaller than the maximum eigenvalue test's critical values.

Table 5.2 Johansen cointegration tests results in lag intervals of 2

		Maximum Eigenvalue Statistics		Trace Statistics	
H_0 Rank = p	λ_i	-Tlog $(1-\lambda_i)$	λ_{max} 95%	-T∑log $(1-\lambda_i)$	λ_{trace} 95%
P = 0	0.901911	58.05**	39.4	123.2**	94.2
P ≤ 1	0.642201	25.69	33.5	65.14	68.5
P ≤ 2	0.537647	19.29	27.1	39.44	47.2
P ≤ 3	0.376332	11.8	21.0	20.16	29.7
P ≤ 4	0.198569	5.534	14.1	8.352	15.4
P ≤ 5	0.106589	2.818	3.8	8.352	3.8

Max-eigenvalue test indicates 1 cointegrating equation at the 0.05 level

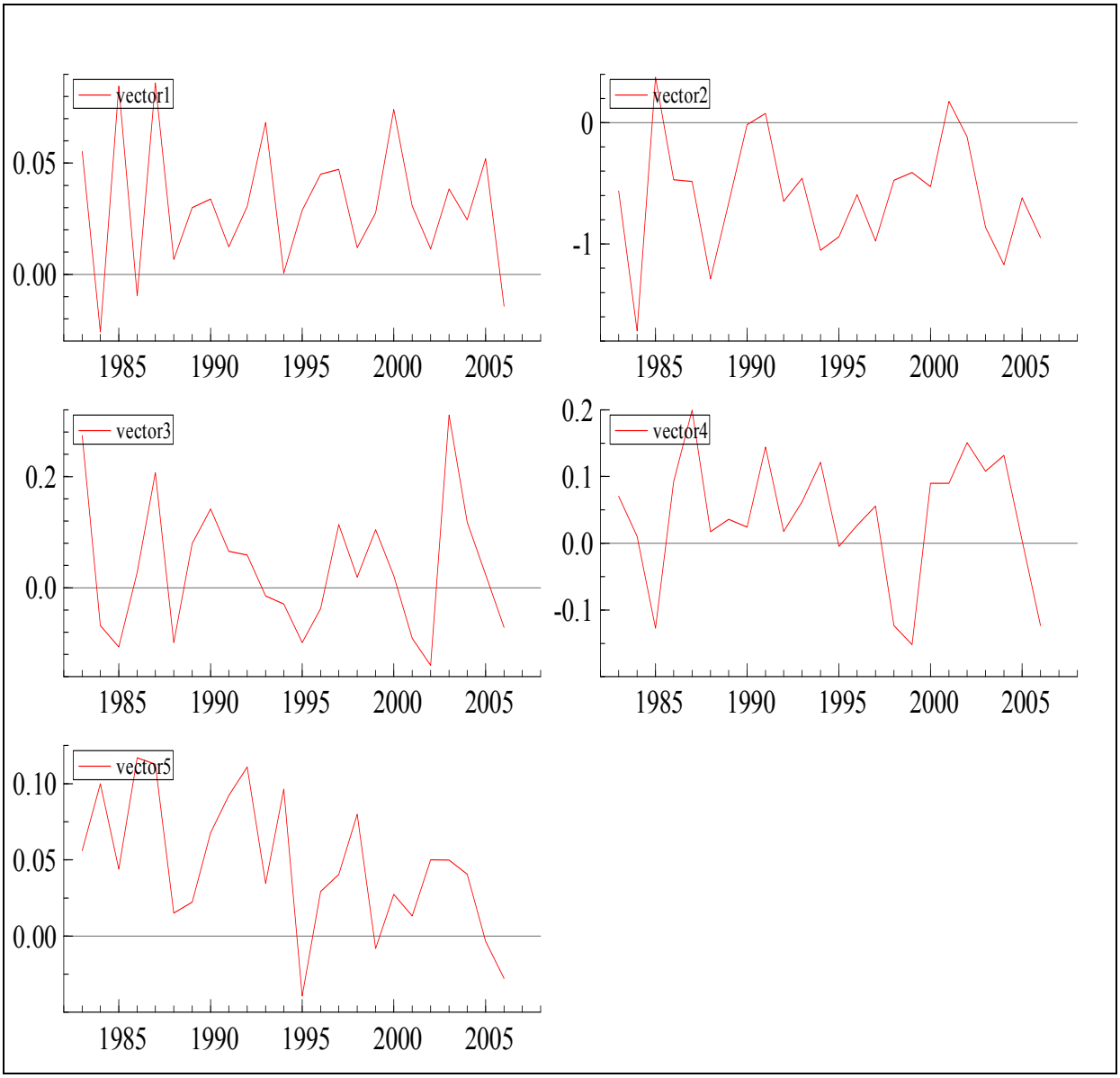
Trace test indicates 1 cointegrating equation at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level

The results indicate that both the Trace and Maximum Eigen value tests reject zero in favour of at least one cointegration vector. The results are significant at 5 percent level. These results prove that the variables are tied together in a single way in the long run, that is, there is one unique long run equilibrium relationship. We therefore conclude that there is one cointegrating relationship in the exports model. What remains is to identify which cointegrating vectors represent the true cointegrating relationship. Since the existence of a long run relationship has been established between exports and real effective exchange rate, exports prices, input prices and trade openness and foreign income, the short run and long run dynamics of the model can be established within an error correction model.

The results of cointegration tests can also be confirmed by plotting graphs of cointegration vectors as shown in figure 5.2. A summary of results shown in Table 5.2 indicated the existence of one cointegrating vector thereby giving rise to stationary cointegration vectors as shown by the graphical results in figure 5.2. Therefore figure 5.2 confirms our informal cointegration test since the figure shows that the plots of cointegration residuals are stationary.

Figure 5.2 Plots of cointegration graphs



5.3 General to Specific Modeling

In implementing the Johansen methodology, we followed the General to Specific (GETS) modeling framework as suggested by Hendry and Krolzig (2001) as against the "Specific to General" traditional approach. The idea is to specify a congruent general unrestricted model (GUM) that captures the main features of the data generation process sufficiently well so that it is not rejected by the data in a range of specification tests. Then statistical tests and procedures are used to reduce the model as much as possible to obtain a congruent more parsimonious model.

GETS has three steps or procedures, the first one is (1) formulate a general unrestricted model (GUM) which agrees with economic theory, (2) simplify the model by eliminating the least significant variables sequentially in an attempt to derive a parsimonious suitable model while at each step checking that the model remains congruent, and (3) test the resulting congruent model against the GUM. The GETS procedure is also applicable in the vector auto regressions (VARs).

In summary, this study started with the specification of a very general or over parameterized model and then, using different tests, reduces the model to the most parsimonious one. The first step in the estimation process is to determine the order of integration of the individual variables. If all of the variables are found to be integrated of integer order greater than zero, the cointegration properties of the variables are investigated in the next step. Therefore, suitable trace tests and maximum eigenvalues tests can be undertaken to identify the number of cointegrating vectors in the model. If cointegrated variables are involved, a vector error correction (VEC) version of a VAR model is used and at this stage, more lags or dummy variables may be added. Finally, extensions of the models are considered to study the robustness of the main conclusions.

5.4 The Error Correction Model

The ECM techniques allow the long run and short run dynamics to be estimated in a single step. The constant term of the single error correction framework is a combination of the short run and

long run constant. This technique has an advantage as it isolates the speed of adjustment parameter which indicates how quickly the system returns to equilibrium after a random shock.

Table 5.3 Modeling South African exports using OLS (1980 – 2006)

INDEPENDENT VARIABLES	**COEFFICIENT**	**T-VALUE**
CONSTANT	0.041564	3.728
$DLPRICE_{t-2}$	0.095299	2.205
DLINPUTS	-0.39329	-2.822
DLTRADEOP	0.51679	5.294
DLREER	-0.19413	-2.094
DLGDPUS	0.33563	1.141
ECT_{t-1}	-0.96973	-4.730
*Dummy*1991	0.051288	2.543
*Dummy*1985	-0.058043	-2.718

Adjusted R^2 = 0.903118

F (9, 14) = 14.501 [0.000] **

Standard error = 0.0158411

Durban Watson = 2.23

AR 1-2 test F (2, 12) = 0.44685 [0.6499]

ARCH 1-1 test F (1, 12) = 0.3486 [0.5659]

Normality test Chiy (2) = 1.2323 [0.5400]

RESET test F (1, 13) = 1.7472 [0.2090]

The South African export model was estimated using annual data on six variables. The estimation results are shown in table 5.3. Data is robust as shown by high adjusted R^2. The outcome is in line with the standard export model used as an explanation for the determinants of exports in South Africa. The results suggest that the statistical fit of the model to the data is satisfactory (as indicated by the value of adjusted R^2) and most of the independent variables are statistically significant at the 1%, 5% and 10% level. Adjusted R^2 is a measure of the closeness of fit in the regression model. The results of the model in table 4.3 show that the Durbin-Watson statistic value is 2.23. Therefore, since it is near 2 we conclude that the model does not suffer from serial correlation.

5.5 Diagnostics

The export model was subjected to rigorous diagnostics tests. The export model was tested for normality, serial correlation, autoregressive conditional heteroskedasticity and stability. Diagnostic tests carried out on the data reveal that the model is reasonably well specified. All of the diagnostic tests support the statistical appropriateness of the equation. Statistically the equation performs well, exhibiting no problems of functional form misspecification. Diagnostic tests also indicated that the residuals are normally distributed, homoskedastic and serially uncorrelated and the parameters appear to be stable. The robustness of the model is confirmed by the diagnostic tests that is AR, ARCH, Normality and RESET. The model passes the autocorrelation (AR) test; residuals are normally distributed as shown by the normality test. The model does not suffer from the heteroskedasticity problem, and it is correctly specified as shown by the ARCH and RESET tests.

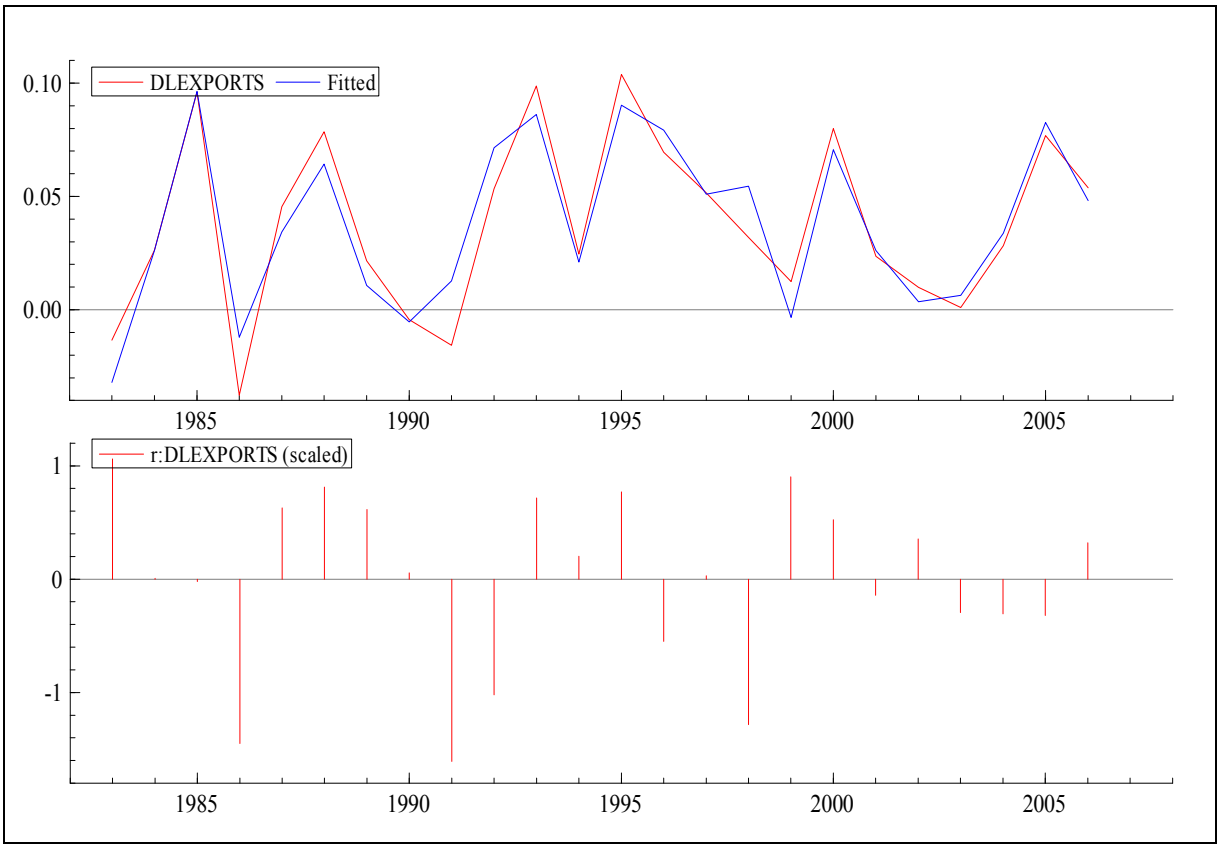
Diagnostic checks are crucial in this analysis because if there is a problem in the residuals from the estimation of the model, it is an indication that the model is not efficient, such that parameter estimates from such a model may be biased. Results from the diagnostic tests performed in this study are presented at the bottom of Table 5.3. Of importance in this analysis are the residual

diagnostic checks for serial correlation, normality and heteroskedasticity. As mentioned in chapter 4, the three tests are based on the null hypothesis that there is no serial correlation, there is normality (recall that one of the assumptions of CLRM is that the residuals are normally distributed with a zero mean and a constant variance and violation of this assumption leads to the inferential statistics of a regression model) and there is no heteroskedasticity problem for the LM and white heteroskedasticity tests, respectively. If heteroskedasticy occurs, misleading conclusions can be made. Heteroskedasticity implies that random variables are spread around their mean values with different variances (i.e. the error terms do not have, as they should, a constant variance.

5.5.1 Actual versus Fitted Residuals

Figure 5.2 shows the robustness of the model where we compare the actual values in relation to the fitted values. The model fits the data reasonably well, although the standard errors suggest that, from a forecasting perspective there is still a substantial margin of error. The wide standard deviation reflects the sharp swings in export experience over the sample period. It also indicates the quality of the data and those factors influencing exports that are not quantifiable or statistically unexplainable.

Figure 5.3 Actual versus fitted residuals



We now turn our analysis to our variable of interest, the real effective exchange rate. The significance of the exchange rate is worth noting. In light of many countries' practice of determining or fixing nominal exchange rates, the real effective exchange rate is seen as a crucial determinant of exports. The real effective exchange rate is significant at the 5% level and the variable has a corresponding t-value of -2.0945. The size of the coefficient means that a 10% increase in real effective exchange rate in South Africa brings about a 19% decrease in the value of exports. The results in table 5.3 show that real effective exchange rate carries the correct sign which is consistent with trade theory.

This result corroborates the theoretical predictions that real effective exchange rate movements are negatively correlated with the growth in real exports. An increase in the real effective exchange rate means a real appreciation for the domestic currency, which makes exportable items more costly. If the real exchange rate appreciates, the demand for exports is likely to fall,

and the reverse is likely to occur if the real exchange rate depreciates. As in most economies, the exchange rate has a significant influence on the demand for exports and hence production. Stability in the exchange rate has allowed South Africa's exporters to secure markets with their counter parts, and has reduced uncertainty associated with exchange rate risk.

Several studies confirm the findings of this study for example, (Francis and Pasquale, 1996) on the export growth and its determinants: regarding some evidence for South Korea and Singapore, real effective exchange rate was statistically significant and it also carried a negative sign. In addition, a study by Naude (2000) confirms that real effective exchange rate carries a negative sign. This relationship is also confirmed in the econometric analyses by Fallon and De Silva (1994), Tsikata (1999) and Golub (2000) who estimated REER elasticities of exports between 0.63 and 1.4. A 1% decline in REER (1% improvement in exports) is estimated to raise manufacturing exports by between 0.63% and 1.4%.

TRADEOP, a measure of the degree of trade openness is significant in regression. Trade openness determines how open an economy is to world trade and the income growth benefits that flow from trade. The positive coefficient of this variable in regression suggests that an increase in trade openness increase exports and thus corroborates the theoretical relationship. The variable has a corresponding t-value of 5.294. The size of the coefficient means that a 10% increase in trade openness increases exports by 50%. Trade openness is defined as the expenditure share of traded goods in overall consumption. Increasing openness means increasing foreign goods expenditure shares in both domestic production and consumption.

The world export price variable carries a correct sign as expected and is significant at 5% level with a positive coefficient of 0.09 (see Table 5.3). The variable has a corresponding t-value of 2.205. If the world export price rises, then demand for exports from South Africa will rise.

The income variable (USGDP) was correctly signed and significantly different from zero. The estimated income elasticity implies a fairly large response of manufactured exports to changes in world income. The variable has a corresponding t-value of 1.141. Results from this study are similar to the findings by Naude (2000) found out that a 10% increase in foreign income

increased exports by 18% in South Africa. Foreign income has a positive impact on export demand suggesting that exports can be regarded as an engine of growth in South Africa. Gouws (2005) found that the impact of income on the volume of exports, although interesting, does not provide the critical information necessary to inform policy formulation.

DLINPUTS is the price of other inputs apart from labour (the proportion of manufacturing production in total output). The inputs variable is statistically different from zero. The variable has a corresponding t-value of -2.822. The size of the coefficient means that a 10% increase in the price of inputs will lead to a 39% decrease in the volume of exports. This result corroborates the theoretical predictions that there is an inverse relationship between the price of inputs or cost of production and output.

The exports model is enhanced by the inclusion of a dummy variable for the year 1991. A dummy variable is a variable that marks or encodes a particular attribute. It is easy to understand that there are variables that can play a very important role in the explanation of an econometric model that are not numerical or easy to quantify, these are known as dummy variables or dichotomous variables. This 1991 dummy captures the changes in political regime that affected production processes. South Africa has become an active competitor in the global market since it opened up its economy in 1991 i.e. the removal of sanctions. South Africa was re-entering international markets following the start of the political transition in February 1990, and the General Export Incentive Scheme (GEIS) was introduced.

In 1991 both the EEC and the US lifted many official sanctions in view of measures taken by Pretoria to begin dismantling apartheid. Foreign investors were slow to return to South Africa, however, most banking institutions considered the country too unstable and foreign corporations faced high labour costs and unrest if they tried to operate there. Trade liberalisation replaced the anti-export bias of the previous policy of import substitution to make way for higher export-led growth. The ratio of exports to GDP has tripled since the end of apartheid. Although the capital account started to improve in 1990 and total gold and other foreign reserves rose to US$2.39 billion, this amount was still equivalent to the cost of only about six weeks of imports of goods and services.

Political instability has been one of the biggest hurdles for exports growth in South Africa. The period since 1985 has been a volatile one in terms of the political and economic climate. The 1985 dummy shows that South Africa's foreign trade and investment were affected by sanctions and boycotts. The most effective sanctions measure was the withdrawal of short-term credits in 1985 by a group of international banks. Immediate loan repayments took a heavy toll on the economy. South Africa's gold and foreign currency reserves were hit hard by the need to repay the nation's loans in 1985 and 1986. At that time, gold holdings were sufficient to cover only about ten weeks of imports. More than 350 foreign corporations at least 200 of which were US owned, sold off their South African investments. The dummy is statistically different from zero at 1% level. It is also instructive to note that the coefficient of the dummy variable is highly significant, confirming the fact that the events of 1985 served to depress exports.

Finally, note that the error-correction term appears with a statistically significant coefficient and displays the appropriate (negative) sign, a finding that accords well with validity of an equilibrium relationship among the variables in the cointegrating equation. This implies that overlooking the cointegratedness of the variables would have introduced misspecification in the underlying dynamic structure. The size of the coefficient means that the speed of adjustment is approximately 96% in South Africa. The adjustment to this long-run relationship, however, is high. According to the adjustment term in the error correction model for exports, only 96% of the deviation from long-run equilibrium is “corrected” in the subsequent period.

5.6 Conclusion

In conclusion, this chapter analysed the relationship between exports and its determinants. It started by analysing the time series properties of the data employing both formal and informal test for stationarity. The Johansen cointegration test provided evidence that there is cointegration between the exports and its determinants. Evidence of cointegration allowed the estimation of VECM. The variables that have a long run relationship with exports include real effective exchange rate, trade openness, world exports prices, foreign income and inputs. Empirical findings of this study reveal that there are other determinants of exports such as political changes

that are important for the exports in South Africa. These results, therefore, corroborate the theoretical framework to a large extent. The speed of adjustment coefficient measures the speed of adjustment in the exports following a shock in the system. This study indicates that about 96% of the variation in exports from its equilibrium level is corrected within one year. This speed of adjustment is slightly higher than those from previous studies on South Africa.

Chapter six

Summary, conclusions, recommendations and limitations

6.1 Summary of the study and conclusions

This chapter attempts to draw conclusions from results of the study and to put forward recommendations for future policy formulation. Determinants and growth of exports has long been a subject of great interest that has generated much discussion in the theoretical literature ever since nations came into being. It is, against this particular background, that it was necessary to investigate and document the potential determinants and growth of South African exports. The overall objective or the primary concern of this study was to investigate the major factors determining the form and volume of exports in South Africa.

This study considered theoretical literature from static comparative advantage principle according to Ricardo and others, the factor proportions model according to Heckscher-Ohlin and the dynamic comparative advantage according to Posner, Vernon and others. In addition to these theories, a number of studies were reviewed. Some of these studies used econometric models to test the determinants of exports empirically. The majority of these studies identified real effective exchange rate, foreign income, GDP, world prices of exports and cost of production as the potential determinants of exports. Some of the researchers carried out surveys and they found that labour cost and geographical location are other determinants of exports. The determinants of exports varied depending on the model or methodology used, and the data and the economies being analysed.

Based on an extensive review of literature on the determinants of exports and on data availability, an empirical model that links exports and its potential determinants was specified. The variables included in this model as potential determinants include real effective exchange rate, GDP for US as a proxy for foreign income, trade openness as a proxy for capacity utilisation, price of other inputs apart from labour (the proportion of manufacturing production in total output) and world price of exports.

In order to determine the long run determinants of real exports, the Johansen cointegration and error correction methodology was preferred to other techniques because of several advantages. When applying this methodology, the researcher started by analysing the time series properties of the data employing both informal and formal tests for stationarity. The variables were found to be integrated of the same order, as all of them were first difference stationary. Johansen cointegration tests provided evidence that there is one cointegrating vector. Evidence of cointegration allowed the estimation of VECMs, which provided the parameter estimates for the long run relationships. All the variables have a long run relationship with the real exports.

The findings of this study show that real effective exchange rate movements are negatively correlated with the growth in real exports. This means, as expected an increase in the real effective exchange rate which means a real appreciation for the domestic currency, which makes exportable items more costly. Trade openness determines how open an economy is to world trade and has a positive coefficient which suggests that an increase in trade openness increases exports. The income variable (USGDP) was correctly signed and significantly different from zero and results from this study are similar to the findings by Naude (2000) and Gouws (2005). The inputs variable is statistically different from zero and the coefficient carries the expected negative sign. These results corroborate both the theoretical predictions and findings from previous research.

Another interesting parameter in VECMs is the speed of adjustment coefficient which, in this study, measures the speed of adjustment in the real exports following a shock in the system. The estimate of this parameter found in this study indicates that about 96 per cent of the variation in the real exports from its equilibrium is corrected within a year. This speed of adjustment is slightly higher than those from previous studies on South Africa.

There are several reasons as to why the speed of adjustment is slightly higher than those from previous studies and these are as follows: The level of production (economic growth) in the country has increased comparing the previous years hence an increase in production leads to an increase in exports. In addition, diversification of exports makes a very big contribution as to

why the speed of adjustment is higher than those previous studies. The issue of export diversification in South Africa has increased the volume of export as compared to the other years. Globalisation created a lot of markets for South Africa as compared to previous years this also makes a contribution as why it is higher than the previous years.

6.2 Policy Implications and Recommendations

The South African economy experienced sluggish growth in exports in the 1980s. This was because of the sanctions and debt crisis. Despite the relatively poor performance during the latter part of the decade, South Africa did succeed during the period of 1992-1999. One clue as to how this was achieved was re-entering international markets following the start of the political transition in February 1990, and the General Export Incentive Scheme (GEIS).

This research makes a contribution to the policy debate by examining the major determinants of South African exports. The study highlights real effective exchange rate as one of the major determinants of exports therefore there is a need for policy measures to maintain stability in currency to keep the country competitive. The econometric results in this study show that an increase in real effective exchange rate has adverse effects on the volume and growth of exports so the country has to maintain its exchange rate. A stable currency is generally good for trade, as it makes business more predictable, reduces risks and means that consumer prices can be kept stable hence artificially high exchange rate can put exporters at a disadvantage.

South Africa should facilitate trade in a new environment through economic interdependence and globalisation. This can be done through aggressive advertising in foreign markets and offering better deals. In other words, the country should develop new markets for products by adding value to its exports. Consequently, increasing market access for South African goods should be advanced vigorously. South Africa should vigorously structure its industrial and trade policy so as to create an environment in which firms can optimise production of exportable products. This can be done in a number of ways:

- The country should create a tax regime which encourages production and exports of goods and services. In addition, the country should improve the education of the population (through better school provision and improved higher education).
- Policy makers should highlight the need to locate factories closer to ports, so that transportation costs will be less. The less costs will be reflected in the lower prices of the goods to be exported. The international market will find South African goods to be a bargain and will buy more.
- The government should offer export promotion programmes that are geared towards development. For example, training programmes, underwriting trade fairs, market investigation study support so as to reduce the costs of exporting while at the same time providing management with information needed to boost exports.
- The government should grant financial assistance (in the form of subsidies) to exporting firms, hence it is essential that South Africa understand that the exporting industries have greatest competitive potential.
- The country should increase government expenditure by maintaining sound and stable macroeconomic policy capable of supporting growth of exports destined for the world markets.

The determinants of exports must be understood for sound export growth strategies in South Africa and growth of exports in the global markets.

6.3 Limitations of the study and areas for further research

Unavailability of data, particularly in developing countries, on the actual variables is one of the limitations which have confronted previous researchers. Some of the variables either have to be excluded in the empirical model, albeit with the risk of an omitted variables bias, or proxies have to be found for those variables. The risk involved in finding proxies is that they may not correctly represent the actual variables, resulting in inconsistent results. Striking this balance poses a serious challenge to empirical studies on the determinants of real exports. However, these problems seem not to have significantly affected the findings presented in this study. The areas for further research that emerge from this study include one for testing the relationship between exports diversification and exports growth. This research did not expound on the

diversification of exports although it talked growth of exports. Therefore, further research should be conducted on the relationship between exports diversification and growth in South African.

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Appendices

Appendix 1 South African data used in the regressions

Years	Exports of goods and services	Domestic price of exports	Real effective exchange rate	Price of inputs	Trade openness	Foreign income(GDPUS)
1980	135356	16.70	161.76	81.60	0.41	5161
1981	128110	16.10	170.21	89.12	0.41	5291
1982	124722	17.48	161.28	84.47	0.37	5189
1983	123065	18.97	177.61	82.95	0.34	5423
1984	126346	22.30	156.66	87.88	0.36	5813
1985	139078	28.80	118.96	86.06	0.35	6053
1986	133946	34.09	109.81	85.16	0.34	6263
1987	140173	37.72	123.93	83.16	0.35	6475
1988	151625	40.19	117.04	89.74	0.38	6742
1989	154932	43.35	117.51	91.89	0.38	6981
1990	154260	45.55	122.62	87.82	0.37	7112
1991	151876	47.51	129.90	84.76	0.37	7100
1992	160215	49.61	134.20	82.22	0.40	7336
1993	176844	54.16	131.70	84.13	0.43	7532
1994	181239	61.55	126.07	87.16	0.46	7835
1995	201063	62.17	123.00	94.31	0.50	8031
1996	215547	70.82	113.00	97.72	0.52	8328
1997	226961	75.29	119.00	100.25	0.53	8703
1998	234329	81.37	110.00	96.90	0.55	9066
1999	237284	86.89	104.00	96.42	0.51	9470
2000	257011	100.00	100.00	100.00	0.53	9817
2001	263161	117.00	88.00	102.77	0.52	9890
2002	265764	145.45	74.00	107.42	0.52	10048
2003	266055	133.12	97.00	105.41	0.52	10301
2004	273694	136.44	108.00	109.97	0.54	10675
2005	295564	143.11	108.00	113.77	0.56	11003
2006	311916	139.00	104.00	119.29	0.60	11319

Source: IFS and DTI, 2008