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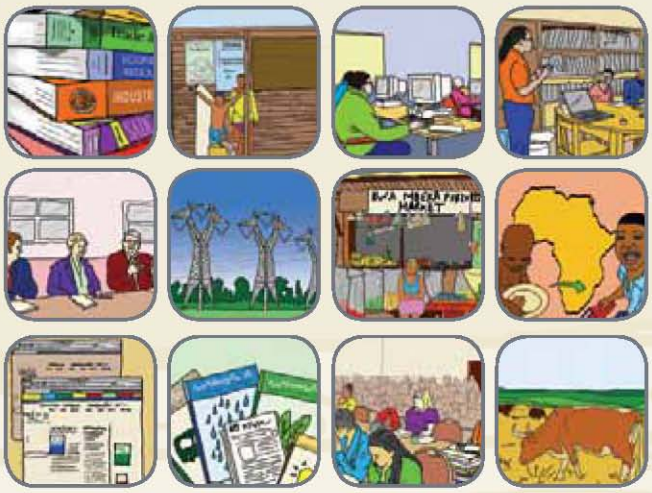

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The Determination and Analysis of Trade Potential for the South Africa Pulp and Paper Industry using a Gravity Model Approach

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indigenous **growth**

THE DETERMINATION AND ANALYSIS OF TRADE POTENTIAL FOR THE SOUTH AFRICAN PULP AND PAPER INDUSTRY USING A GRAVITY MODEL APPROACH.

BY

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1. INTRODUCTION

1.1 BACKGROUND

The primary objective of this study is to conduct empirical research based on a panel study of the South African pulp and paper sector (SIC 13)[1]. The data set consists of panel observations for the period 1994-2008.

This research is important for South Africa's trade analysts and policy makers in this sector, since it will ensure the full utilization of the country's trade potential and in turn lead to the enhancement of economic growth (Eita & Jordaan, 2007:81). The gravity model will be used to forecast the potential international trade flows by looking at specific conditions. It can also be used to establish which priority markets are currently underperforming when taking into consideration their trade potential. These results will help determine how resources could be efficiently allocated to utilize export growth and promote job creation.

The main focus of the research will be on the pulp and paper sector considering the significant role that this sector plays in the South African economy[2] as well as its investment towards domestic resources, innovation and man power (Paper Manufacturing Association of South Africa, 2008:13). It is also one of the sectors identified by The Accelerated and Shared Growth Initiative for South Africa[3] (AsgiSA) and the Department of Trade and Industry for the acceleration of growth (The Presidency Republic of South Africa, 2006:6).

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[1] Standard Industrial Classification (SIC): The method of classifying types of economic activity used in the UK's official statistics. The advantage of a similar classification of industries is that it facilitates international comparisons of the composition and the efficiency of industries (Oxford Dictionary of Economics, 2003:443).

[2] The pulp and paper industry's contribution to GDP in 2006 was approximately R6.5 billion (Paper Manufacturing Association of South Africa, 2008:13)

[3] The Accelerated and Shared Growth Initiative for South Africa is a government project designed to accelerate economic growth to an average of at least 6% between 2010 and 2014. The main goal of this initiative is to halve poverty and unemployment by 2014 (Accelerated and Shared Growth Initiative Annual Report, 2007:2). The current unemployment rate for the 1st Quarter of 2009 is 23,5% (Statistics South Africa, 2009).

Annual bilateral trade volumes analyze the flows of trade between exporting and importing countries. The size of most of these exporting and importing countries is determined by their economies, which will determine their potential trade flow. Consequently, countries with larger economies will have larger trade flows between the relevant countries. However, as a result of high transport costs and the time involved, the distance between countries causes a resistance to trade. Some other factors that hinder international trade flows include import tariffs, border controls and quantity restrictions. Although not related to distance, these indirect or simulated transport costs, affect the goods that are being transported. After determining what the impact of these factors on the bilateral trade may be, bilateral trade can be simulated between these countries. The simulated bilateral trade can then be compared with the countries' actual bilateral trade (Department of Trade and Industry, 2008:2).

The two equations specified by the gravity model will be used to determine the potential bilateral exports of each sector. This will be done by implementing a two step-estimation process. For the first step a standard gravity model equation will be estimated. The variables for this equation include the importer's GDP[4] and population, the South African GDP and population as well as the real exchange rate for the period from 1994 to 2008. For the second step estimation the generated fixed effect estimates from the first regression will be regressed on the distance from South African to the importing countries. Dummy variables for language as well as dummies to determine membership to the European Union, the Southern African Development Community and other Africa regions will be used.
The GDP and population variables symbolize the economic magnitude of both the exporting and importing countries. The distance variable represents the resistance to trade between countries while the dummy variables characterize the potential trade arrangements. Estimated results from the regression look at each sector individually, and help determine which areas may require further development.

For this study the pulp and paper sector will be investigated to determine possible reasons for the sector's lack in reaching its full trade potential. After possible reasons have been identified, they can be used to assist government in its negotiations regarding bilateral trade. In addition, possible

[4] Gross Domestic Product (GDP): 'Gross' indicates that it is calculated without subtracting any allowance for *capital consumption; 'domestic' that it measures activities located in the country regardless of their ownership. It thus includes activities carried on in the country by foreign-owned companies, and excludes activities of firms owned by residents but carried on abroad. 'Product' indicates that it measure real output produced rather than output absorbed by residents. GDP is reported at both current and constant prices (Oxford Dictionary of Economics, 2003:203).

areas of intercession by the government can be identified and extended to examine each individual sector's determinants (Department of Trade and Industry, 2008:2).

1.2 PROBLEM STATEMENT

As a result of underperforming markets and incorrect export growth utilization, South Africa lacks the ability to reach its full international trade potential in certain sectors. Accordingly, if the pulp and paper sector does not reach its full trade potential, its annual contribution to the South African economy will be reduced, leading to a loss of funds for innovation and job creation.

Consequently, the gravity model can determine the impact of the factors that hinder this sector's international trade flows. The results from the model estimates can then be used to simulate bilateral trade between two countries. This simulated bilateral trade data are then compared to the actual bilateral trade data. After comparing the data the sector's resources can then be effectively re-allocated to utilize export growth. Government can also be assisted in its bilateral trade discussions and areas of possible intervention can be pointed out (Department of Trade and Industry, 2008:4).

1.3 PURPOSE STATEMENT

In light of the pulp and paper sector's constraint to reach its full international trade potential an econometric gravity model was designed to forecast the sector's potential trade flows. The model verifies which of the sector's markets is currently under-performing and helps with the efficient re-allocation of resources to utilize export growth and job creation.

1.4 RESEARCH OBJECTIVES

- Determine the impact of the factors that hinder the bilateral trade flows of the pulp and paper industry.
- Forecast potential international trade flows, given specific problematic conditions.
- Establish which priority markets currently under perform given their trade potential.
- Determine efficient resource allocations.
- Utilize export growth and job creation.
- Assist government in its bilateral trade negotiations.

- Inform government on possible areas of government intervention.

1.5 IMPORTANCE AND BENEFITS OF THE PROPOSED STUDY

Foreign exchange reserves are vital in the process of financing imported goods, for example, energy and investment goods. Energy and investment form a fundamental building block to the formation of capital and economic growth. The generation of scarce foreign reserves is important to acknowledge the significant role that exports play in the growth process as well as the ease of pressure that exports bring to the balance of payments and employment creation (Abou-Stait, 2005:1).

Additionally a growth strategy led by exports (export-led growth[5]) encourages producers to rather export their products and consequently improve the local production of goods and services. This improvement in domestic production will increase international competitiveness of these products by means of advanced technology. In turn this increased competitiveness will provide the foreign exchange needed to import goods and services. The impact of external shocks on the domestic economy can also be reduced by exports (Eita & Jordaan, 2007:81). According to Abou-Stait (2005:1) the importance of exports to economic growth can be seen from both the Latin American and Asian economies' experience. Senhadji and Montenegro (1999:273) also stressed the significance of exports in the economic growth process.

One of the sectors identified by AsgiSA and the DTI for the acceleration of growth, halving poverty and unemployment by 2014, is the pulp and paper sector (The Presidency Republic of South Africa, 2006:6).

The pulp and paper industry is important to the South African economy as it contributes R35.26 billion on an annual basis, which is then invested in domestic resources, innovation and man power. The vast competitiveness of this industry in global terms is one of the main attributes to the industry's own expansions, given that its average annual international growth rate has since 1970

[5] Export-led growth: Growth in which exports increase faster than other components of national expenditure. This can occur either because foreign incomes are growing faster than at home, or because domestic products are becoming more competitive in world markets, through lower prices, increased variety, or quality improvements. Export-led growth will cause an increase in imports and is less likely to involve a country with balance-of-payments problems. While a growth strategy based on domestic consumption or investment is more likely to lead to balance-of-payments problems, as imports will tend to rise faster than exports (Oxford Dictionary of Economics, 2003:165).

been outstripped by the South African average. As South African consumers have become more prosperous, due to improving employment and education levels, their demand for high-end fine paper including packaging and labels has increased. This increased demand is reflected in a greater request for high quality markets around the world (Paper Manufacturing Association of South Africa, 2008:13).

Considering the significant role that the pulp and paper industry plays in the South African economy, further investigation into the sector's trade potential to different countries is imperative. The econometric gravity model is used to investigate the pulp and paper industry's trade potential. The model investigates the correlation between the direction and volume of international trade and where member countries are in different stages of development, the formation of regional trade blocks. A range of variables are used in the gravity model to determine their relevance in trade (Martine-Zarzoso & Nowak-Lehmann, 2003:292). These variables consist of the importer's GDP and population, the distance from South Africa, the real exchange rates, the South African GDP and population size as well as various dummy variables.

The focal point of this research study is therefore conducting empirical research by means of an econometric gravity model that will analyze the pulp and paper sector's trade potential.

This research study consists of five main sections. The first section focuses on the delimitations of the study. The 2nd section is a literature review on the role of exports in a country's economy, the South African economy and its effect on the pulp and paper sector, as well as an in-depth look at the pulp and paper industry, its various components and the elements required for sustained and accelerated growth. The 3rd section discusses the research design, estimation methods, the gravity model as well as the results obtained in the estimation process. The last section concludes the study.

2. DELIMITATIONS

The updated econometric gravity model for this panel study focuses on South Africa's trade potential for the pulp and paper sector (SIC13), for the time period 1994 to 2008.

International trade flows include trade between South Africa and the European Union, the Southern African Development Community as well as other African countries with whom South Africa has trade agreements.

Table 1: Abbreviations used in this research paper

Abbreviation	Meaning
SIC	Standard Industrial Code
GDP	Gross Domestic Product
ITPC	Investment and Trade Policy Centre
DTI	Department of Trade and Industry
TIPS	Trade and Industrial Policy Strategies
PAMSA	Paper Manufacturing Association of South Africa
ASGISA	The Accelerated and Shared Growth Initiative for South Africa
FTPP	Forestry, Timber and Pulp and Paper industry
EU	European Union
SADC	Southern African Development Community
OLS	Ordinary least squares
FEM	Fixed effects model
REM	Random effects model

4. LITERATURE REVIEW

4.1 THE ROLE OF EXPORTS IN A COUNTRY'S ECONOMY

Economic growth attributable to export expansion is based on four perspectives. The initial argument is derived from the Keynesian macroeconomic model in the short-run while the remaining arguments are associated with more effective productivity.

The first perspective emphasizes the significant role that exports play in driving the economic activities of a country. This is in view of the fact that exports are the primal source of foreign exchange (McKinnon, 1964:388-409; Thirlwall, 1980). The second observation accentuates export competitiveness, which increases as a result of improving productive efficiency led by international markets (Bhagwati & Srinivasan, 1979:593-594; Feder, 1983:59-73; Kohli & Singh, 1989:391-400; Krueger, 1980:288-292). Thirdly, a point that is particularly important in very small domestic markets, which do not allow for ample specialization, is export development in the main trading

sectors. Production specialization will improve the market's economies of scale[6] (Helpman & Krugman, 1985). Finally, most export oriented sectors are subjected to the distribution of technical knowledge (Grossman & Helpman, 1991). Considering that it's especially valuable for developing countries to access higher levels of technology.

However, the hypothesis supporting exports as a fundamental factor of growth is contrasted by the hypothesis of internally generated economic growth where export development is driven by technical progress. Nonetheless, practical evidence discloses the inability of wide-ranging inference supporting the hypothesis of a growth strategy led by exports. Consequently economic growth as a result of this strategy will now depend on both the chosen country as well as the period. Whereas the idiosyncratic evidence on countries are associated with the distinct geographical nature of trade (Frankel & Romer, 1999:379-399), while the diversity of a single country over different time intervals can be seen as conditional transformations in the policies involving foreign trade.
Results have shown that the conversion to an export promoting policy will simulate a positive growth relationship with exports. Moreover, this export-growth relationship can be used to identify the specific sectors that influence growth.

The South African pulp and paper sector was identified amongst four other lead sectors for the acceleration of economic growth. As a result any constraints which cause this sector not to reach its full trade potential must be identified. This is vital given the significant role that pulp and paper exports play in the generation of both foreign exchange and imported capital goods. Both foreign exchange and imported capital goods are necessary for domestic economic growth as well as the formation of capital. In conclusion, it is important to note that an increased amount of exports in all sectors will support the development of the economy. For this reason it is crucial to encourage the augmentation of exports.

Table 2: South African Trade by chapter (top 15 countries)

47. Pulp of wood or other fibrous cellulosic material, waste and scrap of paper or paperboard.			
Country	**Exports (R 000)**	**Rank**	**Annual Growth**
Name	**2007**	**2007**	**2008-2007**
INDONESIA	821,486	1	0.255

[6] Economies of scale: The factors which make it possible for larger organizations or countries to produce goods or services more cheaply than smaller ones (Oxford Dictionary of Economics, 2003:135).

47. Pulp of wood or other fibrous cellulosic material, waste and scrap of paper or paperboard.			
Country	**Exports (R 000)**	**Rank**	**Annual Growth**
Name	**2007**	**2007**	**2008-2007**
INDIA	426,574	2	0.024
THAILAND	344,552	3	-0.017
GERMANY	313,614	4	0.759
AUSTRIA	312,899	5	-0.534
TAIWAN	249,992	6	-0.383
CHINA	234,589	7	0.266
UNITED STATES	196,557	8	0.292
BELGIUM	175,389	9	-0.957
UNITED KINGDOM	160,219	10	0.346
KOREA REP SOUTH	89,664	11	-0.285
ITALY	51,477	12	-0.323
IRELAND	49,026	13	-0.014
JAPAN	45,808	14	-0.623
PAKISTAN	20,480	15	0.855

Source: Department of Trade and Industry (2008)

Table 3: South African Trade Statistics by chapter

47. Pulp of wood or other fibrous cellulosic material, waste and scrap of paper of paperboard.				
Year	**EXPORTS**	**IMPORTS**	**TRADE TURNOVER**	**TRADE BALANCE**
1994	1,326,600	136,727	1,463,332	1,189,865
1995	2,324,540	192,598	2,517,145	2,131,936
1996	1,557,957	254,225	1,812,185	1,303,727
1997	1,817,881	118,044	1,935,932	1,699,830
1998	1,873,353	178,630	2,051,992	1,694,715
1999	2,231,034	189,983	2,421,021	2,041,047
2000	3,308,734	274,864	3,583,604	3,033,865
2001	2,722,012	223,849	2,945,869	2,498,157
2002	2,996,224	291,247	3,287,479	2,704,970
2003	2,793,118	235,183	3,028,307	2,557,927
2004	2,479,516	238,377	2,717,898	2,241,135
2005	2,599,688	242,923	2,842,621	2,356,758
2006	3,114,012	445,593	3,559,613	2,668,415
2007	3,616,976	415,609	4,032,593	3,201,360

Source: Department of Trade and Industry (2008).

4.2 THE SOUTH AFRICAN ECONOMY AND THE PULP AND PAPER INDUSTRY

On the eve of the 2010 FIFA Soccer World Cup, the South African government have assayed to invest a total of R11 billion in fixed capital formation. Fixed capital formation is expected to grow approximately 10% over the next three years (Annual Budget speech: 2008), ensuring GDP growth in the short to medium term. Gross Domestic Fixed Investment was valued at R441, 938 billion in the 4th Quarter of 2007.

As a result, formal as well as informal economic growth will now become a reality, given government's initiative to invest R2,3 billion through its National Industrial Policy Framework (NIPF). This industrial policy, adopted by cabinet in January 2007, will aid both the forestry and paper industries and in particular the smaller sawmill industry players. These large investments will contribute to the improvement of the industries' capacity, effectiveness, productive skills as well as their access to technology. In addition to this, government made a commitment to these industries to increase the planted areas by 100,000 hectares over the next ten years. Support worth R5 billion will also go towards the industrial policy through tax incentives (Paper Manufacturing Association of South Africa, 2008:11).

The 'Jobs for Growth' programme initiated by the South African government will provide incentives for self-employment by training women, especially in rural areas through micro-enterprises as well as co-operatives. Additional help will also be provided by the Accelerated and Shared Growth Initiative for South Africa to bridge the gap between the country's formal and informal economies.

Government proved its commitment to the pulp and paper industry by investing billions into the promotion of the industry over the last two years. They expanded and upgraded mills, started new machines and the number of small 'tissue paper producing' entrepreneurs have also increased considerably (Paper Manufacturing Association of South Africa, 2008:11).

4.3 THE SOUTH AFRICAN PULP AND PAPER INDUSTRY

Over the past few years South Africa's formal pulp and paper industry has grown into one of the top exporting industries in the country, producing millions of tons of pulp and paper every year. With the exception of Swaziland, South Africa is the only pulp and paper producer on the African continent. As a result the South African Government regards the pulp and paper industry as a high priority sector considering the great demand for these products within the economy. This high

demand ensures a secure market for pulp and paper products. The pulp and paper industry annually contributes R35.26 billion to the South African economy. The sector's average exports for the last few years amounted to R11 billion per annum leading to a net foreign exchange earning of R7 billion per annum, after the deduction of forest product imports. Consequently the Forest Sector contributes 15.6% to the country's trade balance (Paper Manufacturing Association of South Africa, 2008:13).

Table 4: Summary of South African Trade in Pulp, Paper and Paper products
(Values in million Rands)

Imports				
Year	**Pulp**	**Paper**	**Paper products**	**Total**
2004	1487	238	657	3638
2005	1955	234	724	4113
2006	2304	445	1119	5685
2007	2836	416	1448	6889

Exports				
Year	**Pulp**	**Paper**	**Paper products**	**Total**
2004	2480	2785	558	5823
2005	2599	2623	571	5793
2006	3053	3073	601	6728
2007	6317	3856	632	8106

Source: Paper Manufacturing Association of South Africa (2008:14).

In addition to this contribution the pulp and paper industry in unification with the forestry and timber industries are generating direct employment for 170 000 people in South Africa. Approximately 13 500 people are employed by the paper industry and 10 700 by the paper recycling industry. Due to the fact that most of the industry's mills are located in rural areas, people at the centre of the situation are uplifted (Paper Manufacturing Association of South Africa, 2008:27).

It is, however, important to keep in mind that hardly any other industry demands both capital intensive investments on the processing side and prolonged periods of waiting on the resource

side. Mills require a vast amount of funds to stay competitive both domestically and internationally while trees require a significant amount of time to grow. Nevertheless, paper corporations continue to invest in people, resources and technology. Consequently the South African pulp and paper industry will maintain its competitive edge, increase the amount of benefits from fibre, develop skills and create jobs.

Taking into consideration the significant role that the forestry sector plays in job creation and as the number one supplier of raw material to the processing industries one cannot help but notice this industry. Also note that for the sustainability of this industry the protection and expansion of plantations is very important. The significance of this sector is further emphasized when considering their successful management of forestry and first-class pulp and paper-manufacturing companies (Paper Manufacturing Association of South Africa, 2008:30).

The South African pulp and paper industry is represented by the Paper Manufacturing Association of South Africa (PAMSA). PAMSA first opened their doors for business in 1992. Today they represent 90% of the total capacity of paper manufacturing in South Africa and are involved in the manufacturing of paper, pulp, board and tissue products (Paper Manufacturing Association of South Africa, 2008:3).

The consultation firm Genesis Analytics stated in a report, in 2005 entitled “The Contribution, Cost and Development Opportunities of the Forestry, Timber and Pulp and Paper Industries in South Africa” that the Department of Trade and Industry and the Forestry, Timber and Pulp and Paper (FTPP) industry would work together on a sector growth and development strategy. The DTI represents the industry in the Governmental negotiations of bi- and multi-lateral trade agreements. In addition, this sector was also acknowledged in the latest National Industrial Policy Action Plan as a very important contributor to economic growth in South Africa (Edwards & Molony, 2008:5).

PAMSA’s member companies produce over 90% of the paper made in South Africa, and own 18 of the country’s 33 paper mills. These companies include Sappi, Mondi SA, Nampak, Kimberly-Clark, SA Paper Mills and Lothlorien. The smaller sub-associations of PAMSA which are mostly involved in the production of tissue and test liners are the South African Tissue Manufacturing Association (SATMA) and the Paper Recycling Association of South Africa (PRASA).

Other companies with smaller operations include SAFCOL (South African Forestry Company Ltd) and Global Forest Products (Lang, 2007:2).

4.4 PAMSA MEMBERS

4.4.1 South African Paper Mills

South African Paper Mills (Pty) Ltd. is an independent paper mill, situated in Kwazulu-Natal. The mill has been operational for five years and is currently producing 15 000 tons of paper per year. Their products include G.T. Ribbed Kraft, plain Kraft, Testliner, Fluting Paper and White Kraft Paper. They also plan to set up a plant for the manufacturing of paper bags for the retail industry.

The Mill presently exports to 11 African countries including:

- Botswana
- Ghana
- Ivory Coast
- Kenya
- Malawi
- Mauritius
- Nigeria
- Tanzania
- Uganda
- Zambia and
- Zimbabwe

Other countries include Dubai, Germany and the United Kingdom (South African Paper Mills, 2008:4).

4.4.2 Mondi South Africa

Based on sales, Mondi SA holds the number one market position for corrugated packaging, carton board and rigid plastic packaging as well as UFP newsprint in South Africa. Not only are they a major employer but also landowner and producer. Mondi was formed by the Anglo American Industrial Corporation group in 1967, one of the leading mining companies in the world. Mondi became an autonomous company after its disestablishment from the Anglo American group, in early 2007 (Lang, 2007:2). The disestablishment from Anglo American was successfully finalized on 3 July 2007.

In addition to Mondi Limited's headquarters being situated in South Africa Mondi SA is also listed on both the Johannesburg and London Stock Exchanges.

Mondi's operations consist of a wide range of production and manufacturing processes. These processes include the production of paper and packaging products, the growth of wood, the manufacturing of paper and pulp products and lastly the transformation of the packaging products into ridged boxes and bags for industrial use. The focal point of Mondi's expanding packaging production is their release liners, extrusion coating and consumer flexible products (Mondi, 2007b:5).

Mondi is self-reliant in wood for more than half of its pulp-production needs which is its most essential raw material, used for all of its virgin paper-based products. In honour of its quality the Mondi Group's South African plantations were awarded the Forest Stewardship Council (FSC) recertification in 2007 (Hathorn, 2007:6).

Table 5: Mondi pulp mills and products

Company	Mill	Product
Business paper	Richards Bay Mill	Hardwood and softwood kraft pulp
Packaging SA	Piet Retief Mill	Hardwood and softwood NSSC pulp
	Felixton Mill	Unbleached bagasse pulp
Shanduka Newsprint	Merebank Mill	Thermomechanical pulp

Source: Paper Manufacturing Association of South Africa (2008:7).

Table 6: Mondi paper mills and products

Company	Mill	Product
Business paper	Richards Bay Mill	White top and kraft linerboard
	Merebank Mill	Uncoated fine paper
Packaging SA	Felixton Mill	Fluting medium
	Piet Retief Mill	Unbleached linerboard
	Springs Mill	Carton-board
Shanduka Newsprint	Merebank Mill	Newsprint & telephone directory paper

Source: Paper Manufacturing Association of South Africa (2008:7).

Despite Mondi's chipping wood plant, paper, linerboard and pulp mills, they also administer and manage 430 000 hectares of hardwood plantations (Lang, 2007:2).

Mondi's production at the Felixton mill has increased from 110 000 to 155 000 tonnes per year after the recent rebuilding of its corrugated packaging paper machine. The Felixton optimization

project, which was due for commission in March is progressing well. This will enable Felixton to produce lighter weight paper and increase their production by 50 000 tonnes of fluting (Mondi, 2007a:7).

As a major employer Mondi employs more than 1729 people in the business paper sector, 3207 people in the packaging sector and on contract basis they also have around 15 000 people employed mostly in forestry (Mondi, 2007b:47).

4.4.3 Sappi (South African Pulp and Paper Industries Ltd)

The South African Pulp and Paper Industries (Sappi) is not only one of the largest global brands in the pulp and paper industry but they are also listed on three stock exchanges, namely the Johannesburg Stock Exchange as well as the London and Paris Stock Exchanges.

Registered in 1936, today Sappi is a force to be reckoned with owning 465 000 hectares of South Africa's plantations (Lang, 2007:2). More than 70% of the wood supplied to Sappi is Forest Stewardship Council (FSC) certified. In 2008, 72% of the wood requirements of Sappi's Southern African businesses were provided by its own land. Sappi's South African based forest products also allows the company to produce pulp of nearly 2 million tons, which is almost half the output produced by their entire global production. This endows them with enough 'pulp' revenue to satisfy their European business production needs (Sappi, 2008:34).

Table 7: Sappi pulp mills and products

Mill	Product
Ngodwana Mill	Hardwood and softwood kraft pulp
	Groundwood pulp
Tugela Mill	Unbleached softwood pulp
	Hardwood NSSC pulp
Stanger Mill	Bleached bagasse pulp
Enstra Mill	Bleached hardwood pulp
Saiccor Mill	Dissolving pulp

Source: Paper Manufacturing Association of South Africa (2008:7).

Table 8: Sappi paper mills and products

Mill	Product
Ngodwana Mill	White top and kraft linerboard
	Newsprint
Tugela Mill	Kraft linerboard, fluting & other kraft

Mill	Product
Cape Craft Mill	Testliner, fluting and ceilingboard
Enstra Mill	Uncoated printing & writing paper
Stanger Mill	Coated fine paper
	Tissue paper
Adams Mill	Uncoated industrial & wrapping papers

Source: Paper Manufacturing Association of South Africa (2008:7).

The Amakhulu Project involves the upgrading of the Sappi Saiccor mill, which will increase chemical cellulose production by 225 000 tons per year, providing an approximate total of 810 000 ton chemical celluloses per year. Insuring Sappi Saiccor's title as the world's largest and the most efficient producer of chemical cellulose.

To increase its low-cost fibre base, Sappi will invest in about 150,000 hectares of plantations over the next five to 10 years, providing a platform for future growth (Sappi, 2008:38). Sappi's coated fine paper remains favourable both global and locally, with strong demand and increasing prices in the pulp and paper industries.

Coated fine paper is mainly used in books, brochures, magazines, catalogues and various other print applications. Chemical cellulose, of which Sappi is the world's largest producer, is generally used for fibre viscose production, acetate tow as well as products intended for pharmaceutical use. Some of their other products include newsprint, business and uncoated graphical papers, and packaging papers of first-class quality, coated papers of a large variety and a range of paper grade pulp (Sappi, 2008:37).

4.4.4 Nampak

Nampak is a South African-owned packaging organization and also the largest packaging organization in Africa with 90 operations throughout South Africa. They offer the widest product range of any packing company in the world, supported by their world class research and developmental facility in Cape Town. Nampak's Headquarters as well as the majority of operations are based is South Africa (Nampak, 2008:10). Above and beyond packaging Nampak is also the largest manufacturer of tissue paper products.

Table 9: Nampak paper mills and products

Mill	Product
Bellville Mill	Crepe tissue

Mill	Product
Kliprivier Mill	Crepe tissue
Riverview Mill	Crepe tissue
Rosslyn Mill	Fluting and testliner

Source: Paper Manufacturing Association of South Africa (2008:7).

Other Nampak paper-based packaging products:

- Disaki cores and tubes,
- Nampak cartons and labels,
- Nampak corrugated,
- Nampak liquid, and
- Nampak sacks
- Nampak tissue (which contributes 46% of Nampak's revenue).

Nampak is extensively involved in the collection and recycling of all types of used packaging. They collect and recycle 200 000 tons of paper waste per annum, which is then applied in the tissue wadding and packaging production processes at their paper mills.
The commissioning of a second-hand recycling machine in 2008, at Nampak's Rosslyn plant, will reduce the cost of waste-based raw material thereby significantly enhancing Nampak's competitive position. This will also make them self-sufficient in the production of waste-based paper for the corrugated division as well as Nampak Recycling (Bortolan, 2008:17).

According to Nampak's Chief Executive Officer (2008:17), Nampak's revenue increased from R 11 466 million in 2007 to R 12 291 million in 2008, even though the trading income fell form R 1 329 million in 2007 to R 1 222 million in 2008, causing a drop in the margin from 11.6% in 2007 to 9.9% in 2008. It is expected that the improved selling prices, benefits of the new paper mill and the minimal restructuring costs will contribute to a further improvement in Nampak's trading performance for 2009

4.5 PULP AND PAPER SUPPLY CHAIN

Table 10: South Africa at large

National population:	An estimated 48 502 000
Land area:	1 220 088 km²
Forest area:	18 000 km²

Commercial forest area:	1.72 million hectares
Pulp capacity:	2690 million tons
Paper and board capacity:	2938 million tons
Paper and board per capita consumption:	55 kg
Pulp , paper and board mills:	33

Source: Paper Manufacturing Association of South Africa (2008:6).

South Africa has more than 1.5 million hectares of industrial tree plantations, from which a percentage of just more than 66.6% timber, is consumed by the pulp and paper industry. More than half of the plantation area is planted with pine, one-third with eucalyptus and about one-fifth with acacia.

South Africa is the independent supplier of fibrous raw materials used in the local manufacturing process of board, paper and pulp products (Hunt, 2004:1). Fibre's most essential source is locally produced pulpwood. In South Africa the two types of wood used mainly in the production of pulp and paper is eucalyptus which is a hardwood while the softwood used is pine. Most of South Africa's raw materials come from the pine forests of the KwaZulu-Natal and Mpumalanga regions.

The KwaZulu-Natal midland and coastal regions as well as certain regions in Mpumalanga and Tzaneen, located in the Limpopo Province, are well known for their eucalyptus tree plantations. In contrast pine plantations are mainly located in the Western and Southern Cape regions. Pine from these plantations is mainly used in the production of sawn timber.

Mondi has established a block of eucalyptus and pine plantations in the district of Maclear/Ugie situated in the Eastern Cape. Nearly all South African forests meet the requirements set by the Forest Stewardship Council.

Hardwood fibres are not as strong as softwood fibres and so the latter is used to meet strength and bulk requirements in paper production mainly for newsprint, magazine and packaging grades. Hardwood fibres are used in the manufacturing of corrugated carton. A combination of hardwood and softwood fibres as well as filler material is used to produce paper with a smooth finish and good printing quality. Eucalyptus is also used in pulp, mining timber, telegraph poles and sawn timbers whereas pine thinning is used for pulp and mature pine, clear- felled logs, used for housing lumber. Consequently South Africa plants 54.1% pine and 37.2% eucalyptus.

4.6 FOREST MANAGEMENT AND RECYCLING

It is said that an industry is only as sustainable as the resources needed for its continuance. Therefore it is fundamental for the sustainability and success of the pulp and paper industry to successfully management its 1.2 million hectares of forests, 1, 891,362 metric tons of recovered materials and its limited resources of water and air.

However with the stronger rand the forestry sector's export volumes were not met by their export growth in value terms. In order to solve this growing demand problem the government agreed to invest R7 billion in this sector to expand their manufacturing capacity (Edwards & Molony, 2008:1). Sadly the sector is still experiencing constraints in growth due to lack of investment which in turn will lead to an escalating shortage of timber.

This shortage will drastically increase the demand of imports in future. The timber supply problem is further amplified by fire and pests. These are two major concerns of South Africa's forestry management. It is alleged that 50% (approximately 600 000 hectares) plantation estate is presently subjected to infestation by some kind of pest or disease. This kind of damage costs the industry about R600 million per annum in control measures. While fire damages are even greater, considering that 100 000 hectares of forest went up in flames in South Africa and Swaziland in 2007 which led to total losses of R4 billion.

In light of this shortage of fibre new generation mills have shied away from using virgin fibre. Alternatively South Africa uses its new containerboard machines to utilize 100% recycled fibre, which then turns the 1 891 362 metric tons of recoverable paper currently available in South Africa into one of the pulp and paper industry's most valuable resources.

South Africa faces a declining rate of recovered paper, despite increased paper consumption and recycling. Recycling dropped sharply which can be ascribed mainly to the substantial export market of recycled paper which resulted in the forced and costly import of recycled paper by South African paper producers. Given the immense need for recycled paper, with the current recovery rate of paper recorded as 54, 5% by the Paper Recycling Association of South Africa, the need to create a greater recovery rate becomes more vital by the day. Considering that Kraft, for example, recover only 80% of paper and with other grades even more appalling, the opportunity still exists to collect more types of material.

4.7 ELEMENTS REQUIRED FOR SUSTAINED AND ACCELERATED GROWTH

The strategic framework identified by the Genesis Analytics report focuses on four main elements for the acceleration and sustainability of economic growth of the FTPP industries. These elements include:

i. An increase in the supply of raw materials (e.g. fibre);
ii. the easing of supply constraints of downstream processing activities;
iii. the increasing of downstream processing activities; and
iv. Technology transfers and skills development.

Three basic sources have been recognized to improve and maintain the availability of fibre. Theses sources include the improvement of areas used for forestry, the upgrading of management and rehabilitation of existing forestry and the increased usage of recycled paper. When easing the supply constraints focus falls on the saw millers and independent manufacturers of furniture. This is mainly attributable to the fact that saw millers and independent manufactures of furniture do not own plantations of their own, they need to rely on existing plantations. This in turn leads to a lack of timber for processing.

The improvement of downstream processing activities is vital given the capital constraints and vertically integrated nature of pulp and paper mills that prevent smaller downstream industries to compete internationally. Initiatives to develop skills and technology transfer are very important to both the industry and disadvantaged communities. Seeing that this enhances the sector's transformation process as well as boost the ownership of forestry and assets for downstream processing (Department of Trade and Industry, 2005:7).

4.8 PLANTATION EXPANSION

A large part of industrial plantation development, during the period 1920 to early 1960, was thanks to the significant contribution made by the South African government. Private companies led the upgrading process of these tree plantations during the 1960s. In the 1980s, a new wave of development was led by Mondi and Sappi thanks to Sappi's Eastern Transvaal paper and pulp mill and Mondi's Richards Bay pulp mill (Lang, 2007:3).

After 1994 the government's subsidization scheme that focused on wide-range incentives for both exports and taxes was withdrawn. The focal point of this subsidization scheme was to boost the development of the pulp and paper industry, (Garforth & James, 2005:228)

During the early 1990s plantation regions expanded by 45 000 hectares every year. However since 1996, the yearly rate decreased to 11 000 hectares. Although Timberwatch revealed that this rate is inaccurate and is in fact higher, seeing as it excludes plantations that are not registered or illegal. According to estimations made by Timberwatch the alleged proportion of illegal plantations were almost 40 per cent, considering that they were not listed before planting started (Lang, 2007:3).

The current development of plantation regions in the Eastern Cape is a direct result of the efforts by the timber industry and the government of South Africa. According to Timberwatch these newly developed plantations will cover an area of 100 000 hectares (The Timberwatch coalition, 2006:4).

5. RESEARCH DESIGN AND METHODS

5.1 DESCRIPTION OF INQUIRY STRATEGY AND BROAD RESEARCH DESIGN

After a sample of countries[7] was selected the bilateral trade flows between the various countries were measured following an empirical approach. The chosen countries were selected based on South Africa's trade statistics with its main trading partners. The studied sample consists of an average of 37 countries with no less than 15 time-series observations. Taking into consideration that the chosen countries were selected based on South Africa's existing trade statistics, secondary international trade data will be used.

To construct the gravity model two equations explaining the bilateral exports will be estimated. The first equation or standard gravity equation consists of a number of quantitative variables while the second equation includes a combination of quantitative and categorical variables. The variables used in the first regression consist of the importing countries' GDP and population size, South Africa's GDP and population size as well as the real exchange rate (Rand/USD exchange rate). The second equation is a regression of the generated fixed effects, estimated in the first regression, on the distance and the dummy variables for language and the countries with which South Africa trades.

The data set used in this study consists of panel observations. A panel data framework was chosen after closely considering the benefits and limitations of panel data.

[7] For the purpose of this study it will be assumed that the chosen countries have, in theory, reached their full trade potential.

Benefits of panel data:

- It has the ability to control for individual heterogeneity[8].
- Panel data provide data that are more informative, have more variability, have a lower collinearity among the variables, the degrees of freedom increase when using panel data and finally the data is more efficient.
- The dynamics of adjustment can be better studied when using panel data.
- Effects that are not always detected in pure cross-section or time-series data are better identified and measured by panel data.
- Other than pure cross-section or time-series data, panel data can be used to construct and test more complicated behavioral models.
- Micro panel data variables are more accurate than macro panel data variables.

Limitations of panel data:

- Selectivity problems[9].
- The time series dimension could be short.

Source: Baltagi (2005:4-7)

Since the aim of applied research is met the estimated results can be used in the decision making process of policy makers and trade analysts to utilize the country's trade potential and enhance economic growth.]

5.2 THE GRAVITY MODEL

The gravity equation is seen as the most successful device in empirical trade for the past two decades. This equation is related to the movement of a large range of products over both provincial and state borders (Anderson, 1979:106). The standard gravity model of bilateral trade first studied by Tinbergen (1962) and Linneman (1966) relates the trade amongst two countries to

[8] Studies that do not control for heterogeneity run the risk of bias ordinary least square (OLS) estimates, this will be the case when using pure time-series and cross-sectional data (Baltagi, 2005 :4).

[9] Selective problems include self-selectivity, non-responsiveness and attrition (Baltagi, 2005:7).

the product fraction of these countries' GDP and the distance between them as a substitute for the cost of transactions (Carrillo & LI, 2002:8).

The gravity equation was constructed by Eaton and Kortum (1997) using a Ricardian framework while Deardoff (1998) used a Heckscher-Ohlin (H-O) framework. Deardoff also states that the gravity equation is not validated by one or more theories, but it is rather a "fact of life" (Carrillo & Li, 2002:9).

In the past gravity models were only applied to either cross-section data or to a single country's time-series data. The downside of applying only cross-sectional or time-series data is the imposition of various explicit (or implicit) restrictions on the specification of the model. Heterogeneity in trade flows across countries is then more likely to occur. Business cycles (i.e., "time") will also affect bilateral trade flows. Ignoring either of these effects will cause the misspecification of econometric models as well as biased and misinterpreted parameter estimates. In order to identify and correct for these effects a pooled model of time-series and cross-section (panel data) data of the countries of significance is required.

In recent times gravity models have been adapted to a panel data setting. By following this approach the degrees of freedom increase and the source and target country's possibly unobservable trading-pair individual effects and time (or business cycle) effects are accurately specified. Furthermore the estimation techniques are refined to account for any possible simultaneous biasness (Harris & Mátyás, 1998:3).

The gravity model is therefore estimated using a panel data set with individual effects. With the inclusion of individual effects in the regression, a decision must be made on whether the fixed or random effects models will be used.

In theory the random effects model (REM) is more appropriate when estimating typical flows of trade between randomly drawn samples of trading partners from a large population. Alternatively, the fixed effects model (FEM) is used when estimating typical flows of trade between an *ex ante* predetermined selection of nations.

However, one problem that arises when estimating the fixed effects model is that 'constant' variables (over time) cannot be estimated directly. This is due to the fact that the transformation of the WITHIN estimation (process of demeaning variables) wipes out these constant variables. On the other hand, when using the least square dummy variable (LSDV) method, the variables are perfectly collinear with the dummy variables of the fixed effects. So when constructing the

econometric gravity model two separate regressions is estimated to address these problems. These are referred to as the first and second stage estimations. In the first stage the general gravity model is specified and in the second stage the fixed effect estimates generated in the first regression are regressed on the distance variable, as well as the dummy variables for language and all South Africa's main trading partners.

For this study the basic equation, or equation 1, represents the primary equation used for the simulation of potential pulp and paper exports.

$$InX_{it} = C_0 + \beta_1 InEX_{it} + \beta_2 InGDP_{it} + \beta_3 GDPSA_{it} + \beta_4 InPopSA_{it} + \beta_5 InPop_{it} + \beta_6 Dis_i + \beta_7 Lang_i + \beta_8 EU_i + \beta_9 AFR_i + \beta_{10} SADC_i + \varepsilon_{it} \quad .....(1)$$

For $i = 1.....N$ and $t = 1.....T$

X_{it} = Sectoral exports from South Africa to country i.

C_0 = Common intercept

EX_{it} = The Rand/US Dollar exchange rate. The exchange rate is used as a proxy for the relative prices.

GDP_{it} = The GDP of country i over a period of time.

$GDPSA_{it}$ = GDP of South Africa over a period of time.

$PopSA_{it}$ = Population of South Africa over a period of time.

Pop_{it} = Population of country i over a period of time

Dis_i = Distance in km between Pretoria and trading partner's capital cities.

$Lang_i$ = Language dummy for trading partner. The dummy coding English =1, other=0;

EU_i = European Union dummy. The dummy coding EU member=1, other=0;

AFR_i = Africa dummy. The dummy coding African country=1, other=0;

$SADC_i$ = Southern African Development Community dummy. The dummy coding SADC member=1, other=0;

When regressing a panel data set the variables will have a double subscript, i.e.
$i = 1.....N$ and $t = 1.....T$

Where i is the number of countries and t the time interval.

The panel data set exploits a one-way error component model for the disturbances, with $\varepsilon_{it} = \mu_i + v_{it}$. Where ($\mu_i$) are the country-specific effects and (v_{it}) is the remainder (white noise) disturbance term. The country-specific effects (μ_i) are time-invariant and include all the factors of the individual country that are excluded from the regression.

Examples of these exclusions:

i. The unobservable time-invariant political characteristics.

ii. The *unobservable* time-invariant entrepreneurial and managerial skills of the firms' executives in the different countries.

iii. The time-invariant political economy issues relate to the different sectors in each country.

iv. The extent to which each country prefers South Africa's products.

The remainder (white noise) disturbance v_{it} can be seen as the standard disturbance term varying with all time and individual country effects (Baltagi, 2005:1).

When using the fixed effects model the unobservable individual country effects (μ_i) are fixed estimated coefficients and the remainder disturbance term (v_{it}) is independently and identically distributed. ~ $IID(0,\sigma_V^2)$. Also assume that X_{it} are independent from v_{it} for all i and t. With fixed effects models there are N specific countries causing inference to be conditional on these N countries.

For the first stage regression the generalized gravity model equation is used. This generalized equation is represented by equation 2. As mentioned, this is due to the fact that when estimating the fixed effects model the dummy variables cannot be estimated directly. Since the transformation of the WITHIN estimation wipes out these constant variables.

$$InX_{it} = C_0 + \beta_1 InEX_{it} + \beta_2 InGDP_{it} + \beta_3 GDPSA_{it} + \beta_4 InPopSA_{it} + \beta_5 InPop_{it} + \varepsilon_{it} \quad .....(2)$$

A depreciation of the real exchange rate leads to an increase in exports, while an appreciation of the real exchange rate leads to a decrease in exports. It is therefore expected that the coefficient β_1 should be positive when the real exchange rate depreciate and negative when the real exchange rate appreciate.

The importing country's GDP represents the potential demand for imports. An increase in the importer's GDP or income increases their demand for imported products. A higher level of the exporter's GDP, in this case South Africa's GDP, represents higher levels of production. As a result GDP can be interpreted as a substitute for various accessible products, which increases the availability of exports. In other words, it represents the potential supply of exports. The coefficients β_2 and β_3 are therefore expected to have positive signs.

The population variables can affect exports in multiple ways. A larger population is representative of a larger domestic market that is more self-sufficient. A higher level of self-sufficiency then reduces the need to trade. If South Africa's population is large it can either increase or decrease trade. This depends on whether South Africa exports more when it is large or less compared to its smaller trading partners. The importing country's population has similar effects to that of South Africa's population on exports. As a result the effects of neither the exporting nor importing countries' populations can be determined in advance. This means that the coefficients β_4 and β_5 are expected to have ambiguous signs.

For the second stage regression the dummy variables can now be included because when using the least square dummy variable (LSDV) method, the variables are perfectly collinear with the dummy variables of the fixed effects. As a result equation 3 includes the distance variable and the dummy variables for language and all South Africa's main trading partners.

$$\hat{\mu}_i = \alpha_0 + \alpha_1 Dis_i + \alpha_2 Lang_i + \alpha_3 EU_i + \alpha_4 AFR_i + \alpha_5 SADC_i + u_i \qquad (3)$$

The distance coefficient α_1 is expected to be negative, considering that an increase in distance between South Africa and a particular importing country will increase transportation costs leading to more expensive imports. On the other hand the language coefficient α_2 is expected to be positive because a common language between countries is associated with an increase in trade between these countries. The trade agreement coefficients α_3, α_4 and α_5 can either be positive or negative because trade agreements can result in trade creation or trade diversion.

5.3 SAMPLING

For this study the pulp and paper sector (SIC13), one of the 33 individual trade sectors of South Africa, is studied to determine why the sector cannot reach its full international trade potential. An econometric gravity model was constructed to forecast the sector's potential trade flows with the

European Union, the Southern African Development Community and other African countries for the period 1994-2008.

5.4 DATA COLLECTION

The data used in this research study was collected from Quantec Research (Pty) Ltd, a South African based data consultancy firm. The standardized industry data is a broad range of structured SIC 4-digit level industry indicators. International trade data on the other hand consists of South Africa's international trade figure which is organized according to origin at the HS 8-digit and SIC 2-digit levels as well as the destination.

For this study the South African international trade data were used. The data for each structural sector were collected from the Quantec database, which were linearized and modeled using the least squares method.

5.5 DATA ANALYSIS

In constructing the econometric gravity model for this empirical study, South Africa's international trade data were used. Data for each structural sector were collected from the Quantec database and modelled using the least squares method.

A panel data set was used for the estimation process. The three types of models that can be estimated in panel estimation include pooled, fixed and random effects models. Since the regression used in the gravity model includes individual effects either a fixed or random effects model can be used.

If a random effects model is used it is important to take into consideration that the trade flows need to be randomly drawn from a large population sample. While the fixed effects model is more appropriate when the trade flows are between a selections of countries that is *ex ante* predetermined (Egger, 2000: 26). Since this study used a selection of countries the fixed effects model will be more appropriate.

For the first-stage regression the fixed effects WITHIN model is used. This regression then provides the estimation results of all the variables, the diagnostic test results as well as the fixed effects of each country. The estimated fixed effects obtained from the first-stage regression are

used in the estimation of the second-stage regression using a pooled model. This provides the results for the second regression as well as the diagnostic test results.

After the first and second stage regressions are estimated the model structure for the potential exports needs to be generated. The model provides the estimates for the potential exports. The actual export values can now be compared to the simulated potential export values from the gravity model.

5.6 UNIVARIATE CHARACTERISTICS OF VARIABLES

In this study the univariate characteristics of the variables require panel unit root tests prior to the estimation of Equation (1). This determines any potential co-integration between variables. If all variables are stationary, the traditional estimation method can be used for the estimation of the relationship between variables. If the variables are, however, non-stationary, a co-integration test must be performed.

The two main panel unit root tests used in this study include the Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) tests. The Levin, Lin and Chu (LLC) test assumes that the autoregressive parameters are common across cross sections and use the null hypothesis of a unit root. The Im, Pesaran and Shin (IPS) test on the other hand allows the autoregressive parameters to vary across cross sections as well as for individual unit root processes and use the null hypothesis of a unit root.

Table 11: Panel unit root test

Variable	Levin, Lin & Chu t* (LLC)	Im, Pesaran and Shin (IPS) W-stat
Pulp and paper exports	-5.05144 (0.0000)***	-1.83099 (0.0336)**
Importer's GDP(-1)	-9.87023 (0.0000)***	-7.80054 (0.0000)***
South Africa's GDP (-1)	-11.1035 (0.0000)***	-5.22629 (0.0000)***
Importer's population (-2)	-0.47527 (0.3173)	-3.12803 (0.0009)***
South Africa's population	-62.7549 (0.0000)***	-45.9612 (0.0000)***
Real exchange rate	-11.1237 (0.0000)***	-5.48044 (0.0000)***

Note: ***/**/* significant at 1%/5%/10% level. Probabilities are in parentheses.
Source: Authors own estimates: EViews 6.

In Table 11 the LLC test shows that real exchange rate, the South African population as well as exports are significant at a 1% level of significance, but the GDP of the importing country as well as the South African GDP are significant at a 1% level of significance only after first differencing it. Therefore the null hypothesis that each series contains a unit root can be rejected in favour of the alternative that all the series' are stationary. The unit root test for the importing countries' population is not significant at a 10% level of significance after being differenced twice and as a result the null hypothesis that each series contains a unit root cannot be rejected in favour of the alternative that all the series are stationary. The IPS test shows that the real exchange rate and the South African population are significant at a 1% level of significance and exports at a 5% level of significance. Similarly to the LLC test results the GDP of the importing country as well as the South African GDP are significant at a 1% level of significance only after first differencing it. Unlike the LLC test, the unit root tests for the importing countries' population, however, are significant at a 1% level of significance after being differenced twice. This paper uses at least one test to conclude that variables are stationary. As a result all variables are stationary and there is no need to test for cointegration, and Equation (1) can be estimated using the traditional estimation method.

5.7 ESTIMATION RESULTS

Table 12: First regression results

Dependent variable: Pulp and paper exports

Variables	**Fixed effects model**
Constant	-1.535 (-0.443)
Real exchange rate	-0.235 (-1.748)*
Importer's GDP(-1)	0.724 (7.876)***
South Africa's GDP(-1)	-0.455 (-3.788)***
Importer's population (-2)	1.845 (5.473)***
South Africa's population	2.953 (2.535)**
Adjusted R-squared	0.861478
F-statistic	72.29169***

Note: ***/**/* significant at 1%/5%/10% level. The t-statistics are in parentheses.
Source: Authors own estimates: EViews 6.

The coefficient of the real exchange rate is statistically significant at a 10% level of significance, while the coefficient for the South African population is statistically significant at a 5% level of significance. The coefficients of the rest of the variables are all statistically significant at a 1% level of significance.

Meeting my a priori expectation the variables for the real exchange rate, the importing countries' GDP, the importing countries' as well as the South African population indicate the correct economic relationship. It can therefore be concluded that these variables do make economic sense. South Africa's GDP, however, do not meet my a priori expectation and will therefore form the basis for future research.

The Adjusted R-squared: 0.861478

This high Adjusted R-square value indicates that the model is a good fit. Moreover, 86% of the variation in pulp and paper exports can be explained by the variation in GDP of the importing countries as well as the South African GDP, population of both the importing countries and South Africa and the real exchange rate. The F-test was employed to test for poolability of the data. The null hypothesis of equality of individual effects was rejected. Therefore it can be concluded that a model with individual effects is more appropriate than the pooled model.

The country specific effects can be seen in Table A1 of the Appendix. Although these specific effects are included in the regression it represents the unique factors of each individual trading partner. It is an indication of the variation and unique characteristics of pulp and paper exports between South Africa and its trading partners. From the table it can be seen that Angola, Australia, Austria, Belgium, Cameroon, the Central African Republic, Ghana, Ireland, Israel, Kenya, Kuwait, Madagascar, Malawi, Mauritius, Mozambique, New Zealand, Taiwan, Tanzania, Uganda, the United Kingdom, Zambia and Zimbabwe promote South African pulp and paper exports. Conversely the table shows the unobservable country features that discourage trade to Argentina, China, the Democratic Republic of the Congo, France, Germany, India, Italy, Japan, the Netherlands, Nigeria, the Republic of Korea, Saudi Arabia, Spain, the United Arab Emirates and the United States of America (shaded countries). These unobservable features necessitate trade policy analyst and policy makers to analyse the factors that discourage pulp and paper exports to countries with negative effects. This will help analysts and policymakers to identify the export constraints to these countries.

Table 13: Second regression results

Dependent variable: Fixed effects

Independent variables	**Coefficient (t-statistics)**
Constant	-0.898 (-10.347)***
Distance	-0.0002 (-16.887)***
English language dummy	0.908 (12.722)***
SADC dummy	4.196 (91.125)***
Africa dummy	3.110 (71.247)***

European Union dummy	1.719 (12.685)***
Adjusted R-squared	0.972154
F-statistic	3869.250***

Note: ***/**/* significant at 1%/5%/10% level. The t-statistics are in parentheses.
Source: Authors own estimates: EViews 6.

All the variables are statistically significant at a 1% level of significance. Furthermore all the variables show the correct economic relationship. As a result it can be concluded that the inclusion of these variables in the regression does make economic sense.

The Adjusted R-squared: 0.972154
Once again this high Adjusted R-square value indicates that the model is a good fit. Moreover, 97% of the variation in the dependent variable can be explained by the variation in distance between the importing country and South Africa and the dummy variable for language, the European Union, the Southern African Development Community and other African countries.

5.8 TESTING FOR HETEROSKEDASTICITY

The LM-value (284.493) indicates that the null hypothesis of homoskedasticity is rejected, concluding that the cross-sections are heterogeneous and that dynamic adjustment takes place over time.

5.9 EXPORT POTENTIAL

The fixed effects of Equation (1) are simulated in order to determine the within export potential of pulp and paper products. The estimated exports are then compared to the actual exports to check whether there is unexploited trade potential. The results are presented in Appendix A.

If was found that for Angola, Cameroon, the Democratic Republic of the Congo, Ireland, Germany, Malawi, Kenya, Kuwait, Madagascar, the Netherlands, New Zealand, Nigeria, the Republic of Korea, Spain, Saudi Arabia, the United States and Zimbabwe actual exports are greater than potential exports. For countries like Argentina, Austria, Belgium, the Central African Republic, China, Mauritius, Mozambique, Taiwan, Tanzania and the United Arab Emirates potential exports are in fact higher than actual exports. It is therefore important to promote pulp and paper exports to these countries in order to fully utilize trade potential.

Australia, France, India, Israel, Italy, Japan, the United Kingdom, Uganda and Zambia are the countries with the biggest trade potential. As a result these countries should be a high priority for trade analysts and policy makers, because they will help to determine how resources should be re-allocated, in order to utilize export growth.

6. CONCLUSION

For this panel study of South Africa's pulp and paper sector (SIC 13) for the period 1994 to 2008, the factors that determine trade flows between South Africa and its main trading partners were analysed. The model includes 37 of South Africa's main trading partners. The estimated fixed effects model was solved to determine, WITHIN sample, potential trade exports for pulp and paper products. The potential exports were compared to actual exports to determine if there is unexploited trade potential.

In the study the a priori expectation was met that an increase in the importer's GDP causes an increase in exports, however the expectation about the relationship between exports and the South African GDP was not met. This indicates that an increase in the South African GDP will result in a decrease in exports. The negative relationship between these two variables would therefore form the basis of future research.

Furthermore if South Africa's population increases it will have a considerable impact on exports. This relationship is in line with the definition of economies of scale, which states that bigger countries (with a large population) can produce goods cheaper than smaller countries and as a result export more.

As expected it was also found that the difference in distance is negatively related to exports. The reason for the negative relationship can be attributable to the fact that the further away a country is located from South Africa the higher the import costs. Higher import costs are mainly the result of higher transportation costs.

South Africa's membership to the European Union and the Southern African Development Community as well as South Africa's trade relationship with other countries on the African continent appears to encourage exports. South Africa exports more pulp and paper products to countries where English is the official language. This is consistent with theoretical expectations.

Another vital matter to consider is the fact that South Africa's pulp and paper exports are both capital and skill-intensive. This plays a vital role when improving downstream processing activities,

considering the capital constraints and the vertically integrated nature of pulp and paper mills that prevent smaller downstream industries to compete internationally. Furthermore, pulp and paper exports are also resource based, requiring a vast amount of funds to keep its competitive edge both domestically and internationally. As a result of the financial crisis South Africa's GDP has suffered along with various other developing economies, reducing the availability of the necessary funds.

Previous research has also shown that relative prices do have an impact whereas excessive price increases affect South African exports negatively. Other factors that influence trade potential are the sanctions period, foreign investment, trade openness skill constraints as well as custom duties and tariffs.

In his latest research Edwards (2003) found that South Africa acts like a small price taking country in international transactions. The result is that South Africa's exports are supply constrained, and a more in-depth look at the domestic constraints that affect the supply of exports is required to determine the reasons for the lack in growth.

When considering South Africa's simulated trade potential it was found that for Angola, Cameroon, the Democratic Republic of the Congo, Ireland, Germany, Malawi, Kenya, Kuwait, Madagascar, the Netherlands, New Zealand, Nigeria, the Republic of Korea, Spain, Saudi Arabia, the United States and Zimbabwe the actual exports of these countries are greater than their potential. It is important to note however, that even though pulp and paper exports have increased to these countries, its export growth has not increased efficiently to compare to other developing countries.

On the other hand for countries like Argentina, Austria, Belgium, the Central African Republic, China, Mauritius, Mozambique, Taiwan, Tanzania and the United Arab Emirates potential exports are actually higher than their actual exports. This suggests that it is important to encourage pulp and paper exports to these countries in order to fully exploit trade potential.

Finally it was found that Australia, France, India, Israel, Italy, Japan, the United Kingdom, Uganda and Zambia have the biggest trade potential. This can be either a result of growing populations or economic growth in these countries. However, the most important part is for South Africa to now fully exploit its trade potential to these countries and therefore an analysis of the factors that discourage export potential of pulp and paper products are very important.

7. LIST OF REFERENCES

Abou-Stait, F. 2005. *Are Exports the Engine of Economic Growth? An Application of Cointegration and Causality Analysis for Egypt, 1977-2003.* Economic Research Working Paper Series. (no. 76). Tunisia: African Development Bank.

Anderson, J.E. 1979. A theoretical foundation for the gravity equation. *American Economic Review,* 69(1):106-116.

Balaguer, J. & Cantavella-Jordá, M. 2004. Export composition and Spanish economic growth: evidence from the 20th century. *Journal of Policy Modeling*, 26:165–179.

Baltagi, B.H. 2005. *Econometric analysis of panel data.* 3rd ed. New York, NY: John Wiley & Sons.

Bhagwati, J. & Srinivasan, T. 1979. Trade policy and development. In: Dornbusch, R. & Frenkel, J. (eds.) *International economic policy: Theory and evidence*. Baltimore, USA: University Press.

Department of trade and Industry. 2008. *A gravity model for the determination and analysis of trade potential for South Africa.* [Online] Available from: http://www.dti.gov.za/stats/gravity.pdf. [Accessed: 2009-04-06].

Department of trade and Industry. 2005. *Strategic framework for the forestry, timber, pulp and paper industry.* [Online] Available from: http://www.forestry.co.za//growth%20for%20forest%20sector%202007.pdf. [Accessed: 2009-06-23].

Carrillo, C. & Li, C.A. 2002. *Trade blocks and the gravity model: Evidence from Latin American countries*. [Online] Available from: http://www.essex.ac.uk/economics/discussion-papers/papers-request.shtm. [Accessed: 2009-07-27].

Edwards, M.B.P. & Molony, J. 2008. *Country report: South Africa.* [Online] Available from: http://foris.fao.org/meetings/download//cr_south_africa.pdf. [Accessed: 2009-07-20].

Edwards, L. 2003. *Exchange rate depreciation and the trade balance in South Africa.* Report prepared for the National Treasury.

Egger, P. 2000. A note on the proper econometric specification of the gravity equation. *Economic Letters*, 66:25-31.

Eita, J.H. & Jordaan, A.C. 2007. South Africa Exports of Metal and Articles of Base Metal: A Gravity Model Approach. *J.Stud.Econ.Econometrics*, 31(3):81-96.

Feder, G. 1983. On exports and economic growth. *Journal of Development Economics*, 12:59–73.

Frankel, J. & Romer, D. 1999. Does trade cause growth? *The American Economic Review*, 89:379–399.

Garforth, M. & Mayers, J. 2005. *Plantations, Privatization, Poverty and Power. Changing Ownership and Management of State Forests*. London: Earthscan.

Grossman, G.M. & Helpman, E. 1991. *Innovation and growth in the global economy*. Cambridge, USA: MIT Press.

Harris, M.N. & Mátyás, L.. 1998. *The econometrics of gravity models.* [Online] Available from: http://www.ecomunimelb.edu.au/iaesrwww/home.html [Accessed: 2009-06-23].

Helpman, E. & Krugman, P. 1985. *Market structure and foreign trade*. Cambridge, USA: MIT Press.

Kohli, I. & Singh, N. 1989. Exports and growth: Critical minimum effort and diminishing returns. *Journal of Development Economics*, 30(2):391–400.

Krueger, A. 1980. Trade policy as an input to development. *American Economic Review*, 70:288–292.

Lang, C. 2007. *Pulp Mill Watch Factsheet. Country Profile: South Africa*. [Online] Available from: http://www.pulpmillwatch.org/countries/south-africa/ [Accessed: 2009-03-18].

Martinez-Zarzoso, I. & Nowak-Lehmann, F. 2003. Augmented Gravity Model: An Empirical Application to Mercosur-European Union Trade Flows. *Journal of Applied Economics*, 6(2):291-316.

McKinnon, R. 1964. Foreign exchange constraint in economic development and efficient aid allocation. *Economic Journal*, 74:388–409.

Mondi Group. 2007a. *Half Yearly Report.* [Online] Available from: http://www.mondigroup.com/ [Accessed: 2009-03-11].

Mondi Group. 2007b. *Sustainability Report.* [Online] Available from: http://www.mondigroup.com/ [Accessed: 2009-03-04].

Naledi. 2005. *Pulp and Paper Sector Summit Resource Book*. [Online] Available from: http.//www.naledi.org.za/cgi-bin/naledi/na-showitem.pl?publication:1131127739 [Accessed: 2009-03-12].

Nampak. 2008. *Beyond the Blue: Annual Report.* [Online] Available from: http://www.nampak.com [Accessed: 2009-03-04].

Paper Manufacturing Association of South Africa. 2008. *Paper: The Power to Move You*. [Online] Available from: http://www.pamsa.co.za/images/pamsa/PAMSA2008.pdf [Accessed: 2009-03-04].

Presidency Republic of South Africa. 2006. *Accelerated and Shared Growth Initiative-South Africa.* Pretoria: Presidency Republic of South Africa.

Sappi. 2008. *Annual Report*. [Online] Available from: http://www.sappi.com/ [Accessed: 2009-03-24].

Senhadji, A.S. & Montenegro, C.E. 1999. Time Series Analysis of Export Demand Equations: A Cross-Country Analysis*. IMF Staff Papers*, 46(3):259-273.

Statistics South Africa. 2009. *Key indicators – 1st Quarter 2009.* [Online] Available from: http://www.statssa.gov.za/keyindicators/keyindicators.asp [Accessed: 2009-07-24].

Statistical Calculator. 2009*.* [Online] Available from: http://www.danielsoper.com/statcalc/calc12.aspx [Accessed: 2010-01-06].

Thirlwall, A.P. 1980. *Balance of payments theory and the United Kingdom experience*. London: Macmillan.

Timberwatch. 2006. *The Timberwatch coalition in 2006: An overview*. [Online] Available from: http://www.timberwatch.org.za/archives.html [Accessed: 2009-03-11].

8. APPENDIX A

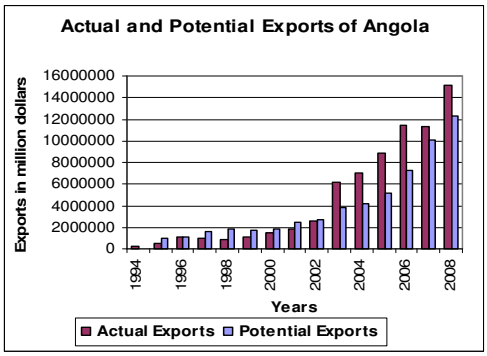
Data and Results

For this study, the estimation process includes thirty seven exporting countries for the period 1994-2008. The data for exports, GDP, real exchange rate and population was collected from Quantec Research (Pty) Ltd at http://www.quantec.co.za. The distance data was attained through a distance calculator available at http://www.timeanddate.com/worldclock/distance.html. All the estimates were done by authors in EViews 6.

Table A1: Fixed effects for pulp and paper products

ANGOLA	1.246866
ARGENTINA	**-1.401060**
AUSTRALIA	0.054263
AUSTRIA	2.420963
BELGIUM	1.614229
CAMEROON	1.190190
CENTRAL AFRICAN REPUBLIC	3.965207
CHINA	**-12.86501**
DEMOCRATIC REPUBLIC OF THE CONGO	**-0.317625**
FRANCE	**-3.517586**
GERMANY	**-2.931935**
GHANA	1.552342
INDIA	**-6.938520**
IRELAND	0.073997
ISRAEL	2.364739
ITALY	**-2.553120**
JAPAN	**-5.644539**
KENYA	1.286549

KUWAIT	2.153182
MADAGASCAR	2.656957
MALAWI	3.945870
MAURITIUS	7.548011
MOZAMBIQUE	3.184368
NETHERLANDS	**-1.510933**
NEW ZEALAND	3.124934
NIGERIA	**-1.980300**
REPUBLIC OF KOREA	**-3.003478**
SAUDI ARABIA	**-0.954015**
SPAIN	**-1.332235**
TAIWAN	2.745261
TANZANIA	2.981426
UNITED ARAB EMIRATES	**-0.627141**
UGANDA	1.872755
UNITED KINGDOM	1.779321
UNITED STATES OF AMERICA	**-11.01010**
ZAMBIA	4.220562
ZIMBABWE	4.523205


Actual and Potential Exports of Angola
Exports in million dollars
16000000
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Years
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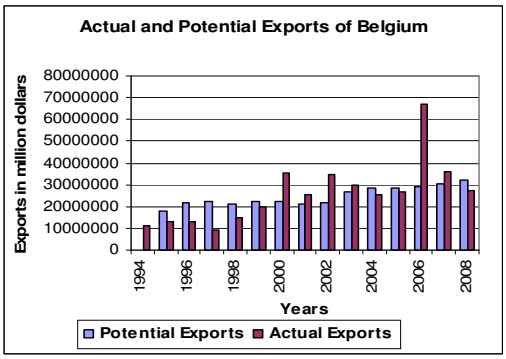
Potential Exports


Actual and Potential Exports of Belgium
Exports in million dollars
80000000
70000000
60000000
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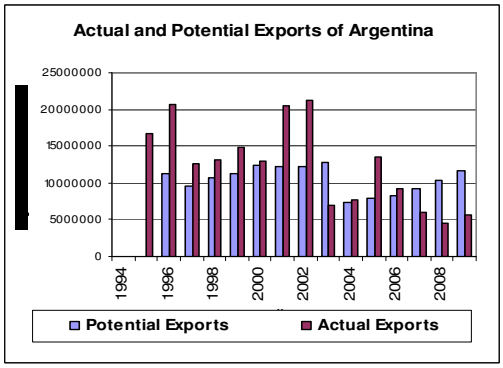
Years
Potential Exports
Actual Exports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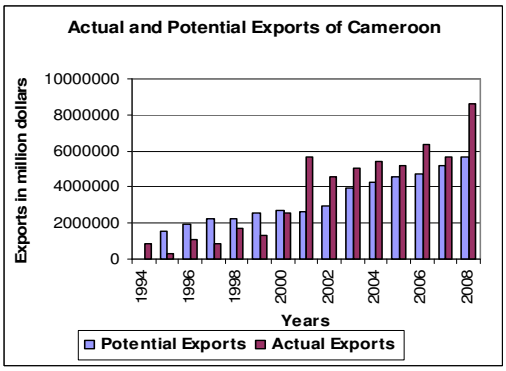
Potential Exports
Actual Exports


Actual and Potential Exports of Cameroon
Exports in million dollars
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Potential Exports
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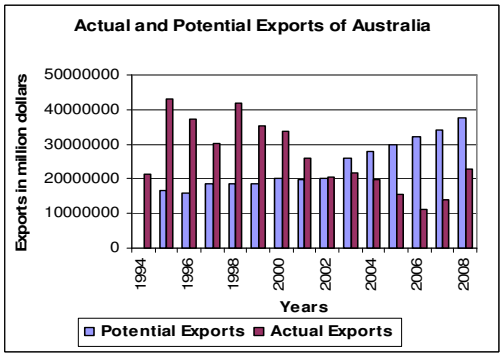
Actual and Potential Exports of Australia
Exports in million dollars
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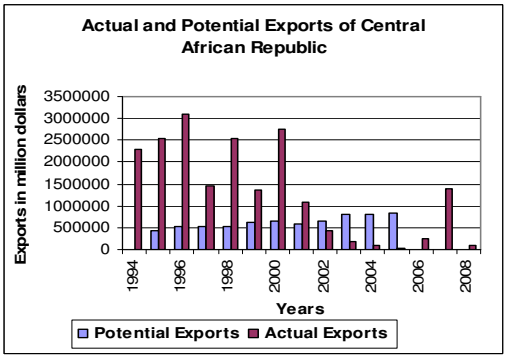
Years
Potential Exports
Actual Exports


Actual and Potential Exports of Central African Republic
Exports in million dollars
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3000000
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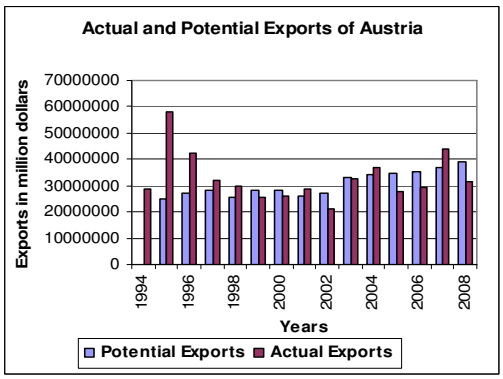
Years
Potential Exports
Actual Exports


Actual and Potential Exports of Austria
Exports in million dollars
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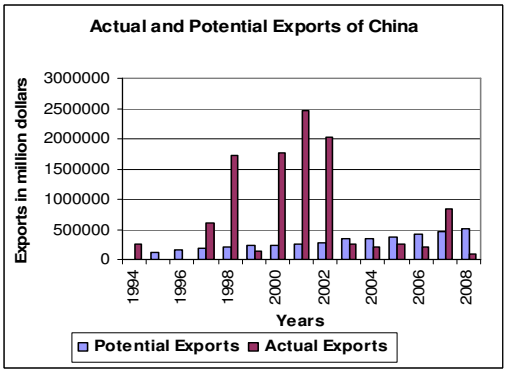
Actual and Potential Exports of China
Exports in million dollars
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Potential Exports
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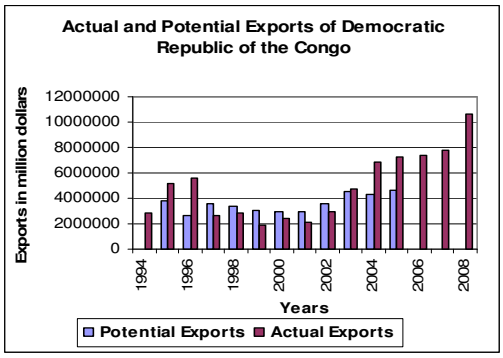
Actual and Potential Exports of Democratic Republic of the Congo
Exports in million dollars
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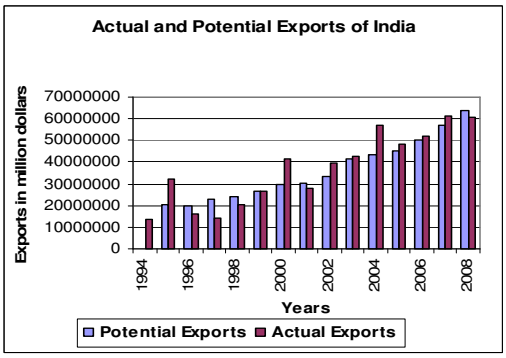
Potential Exports
Actual Exports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Exports in million dollars
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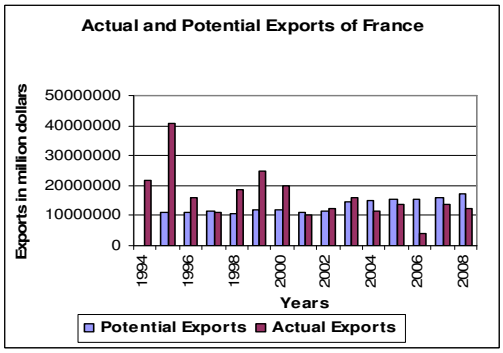
Actual and Potential Exports of France
Exports in million dollars
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Actual and Potential Exports of Ireland
Exports in million dollars
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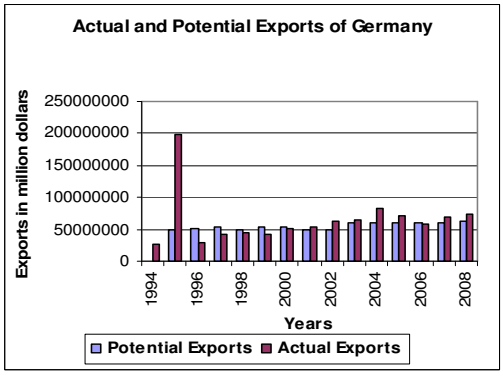
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Exports in million dollars
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Actual and Potential Exports of Israel
Exports in million dollars
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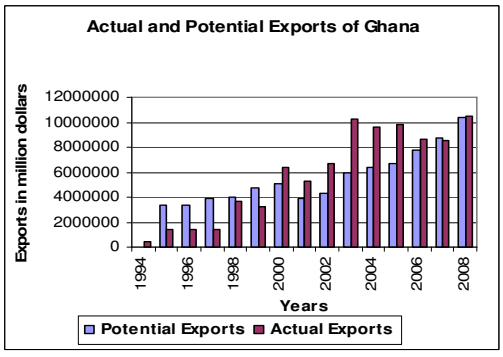
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Exports in million dollars
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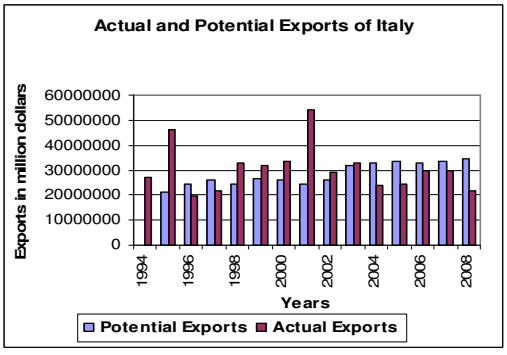
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Exports in million dollars
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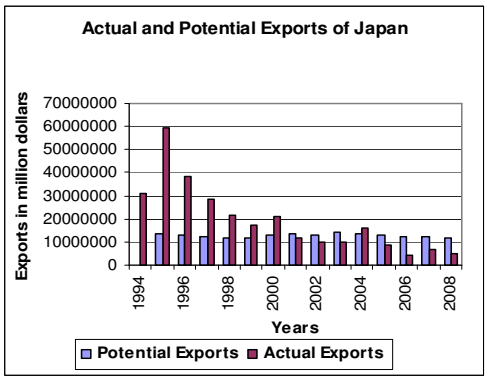
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Exports in million dollars
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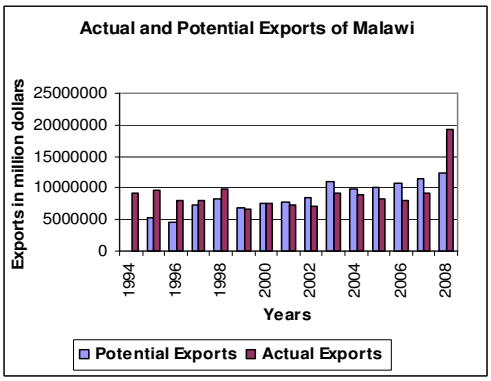
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Exports in million dollars
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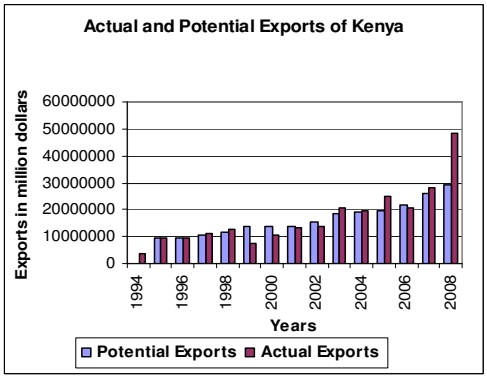
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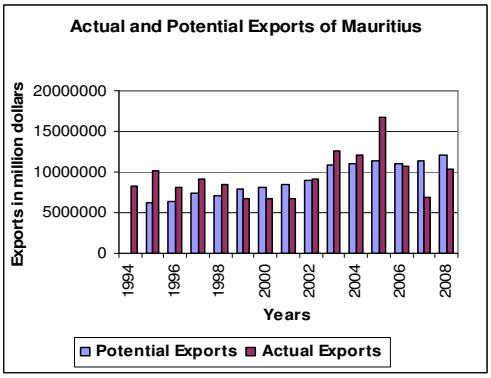
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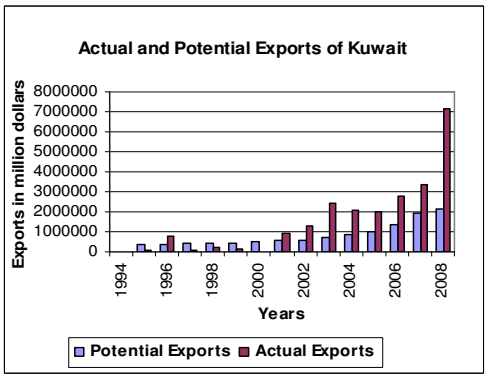
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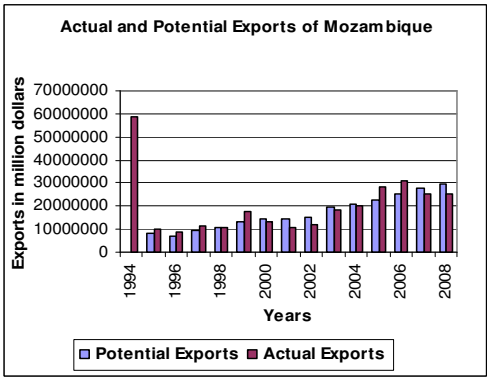
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Exports in million dollars
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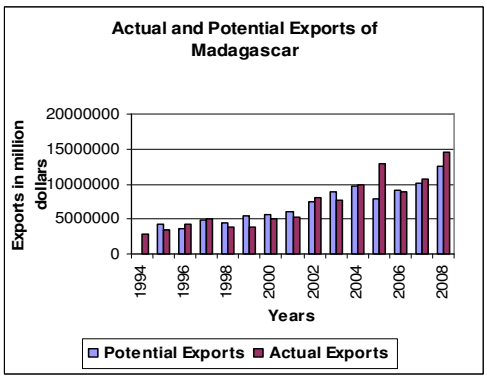
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Exports in million dollars
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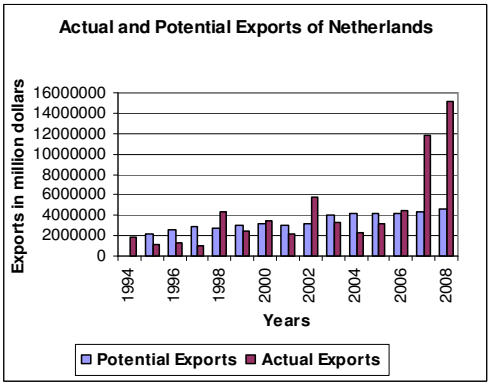
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Exports in million dollars
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Actual and Potential Exports of Nigeria
Exports in million dollars
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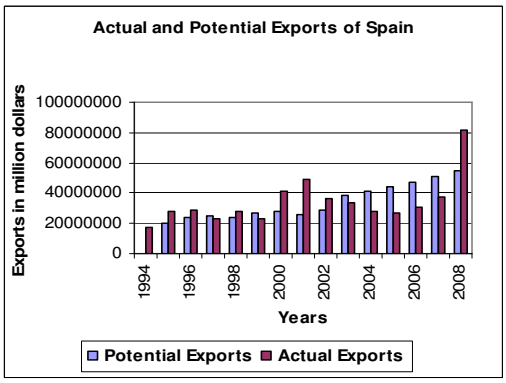
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Exports in million dollars
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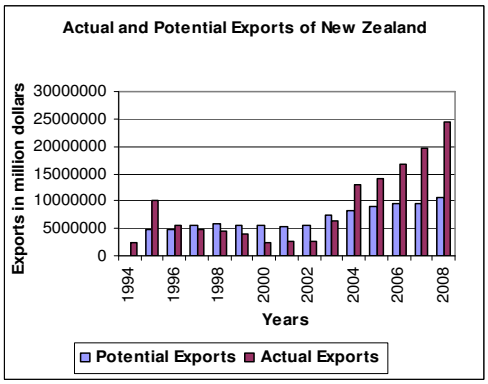
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Exports in million dollars
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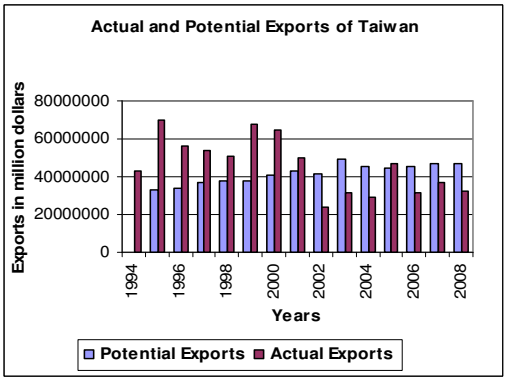
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Exports in million dollars
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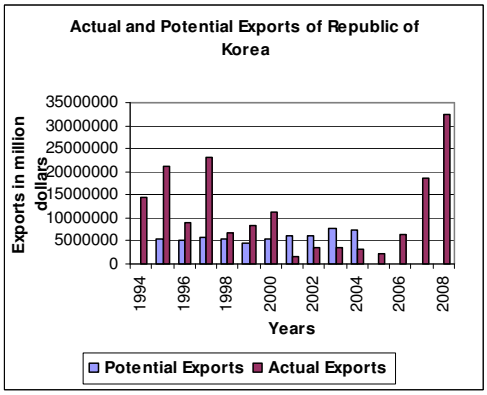
Potential Exports
Actual Exports


Actual and Potential Exports of Republic of Korea
Exports in million dollars
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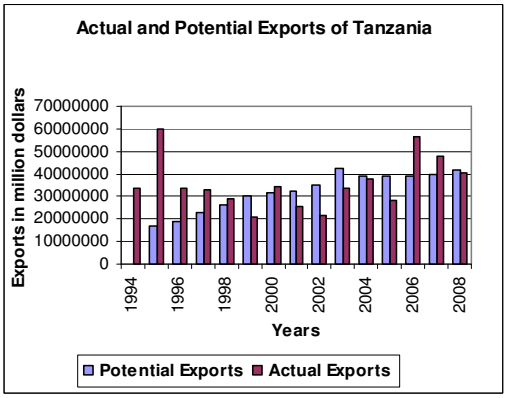
Potential Exports
Actual Exports


Actual and Potential Exports of Tanzania
Exports in million dollars
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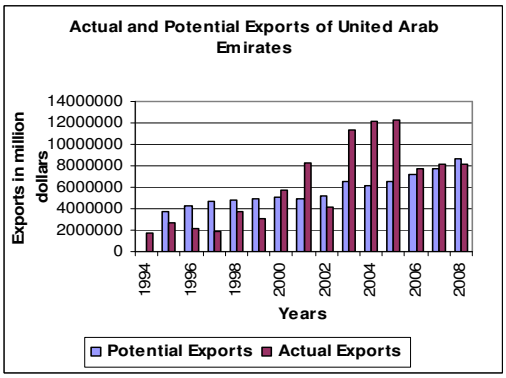
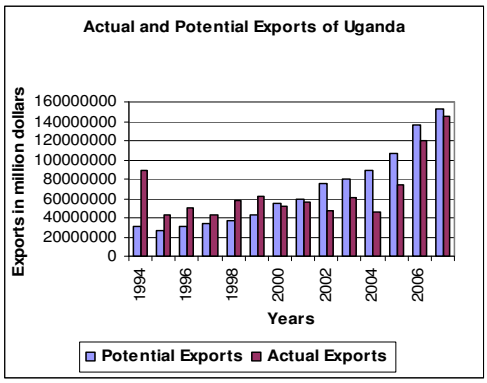
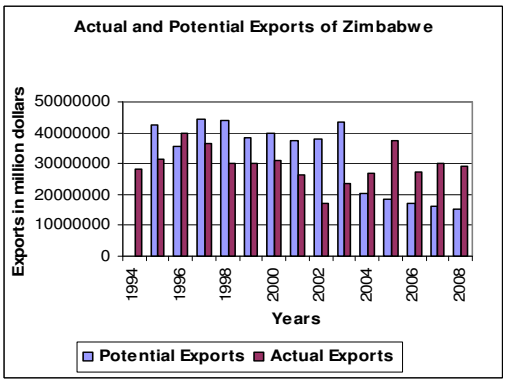
60000000
50000000
40000000
30000000
20000000
10000000
0
1994
1996
1998
2000
2002
2004
2006
2008
Years
Potential Exports
Actual Exports


Actual and Potential Exports of Saudi Arabia
Exports in million dollars
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
1994
1996
1998
2000
2002
2004
2006
2008
Years
Potential Exports
Actual Exports


Actual and Potential Exports of United Arab Emirates
Exports in million dollars
14000000
12000000
10000000
8000000
6000000
4000000
2000000
0
1994
1996
1998
2000
2002
2004
2006
2008
Years
Potential Exports
Actual Exports





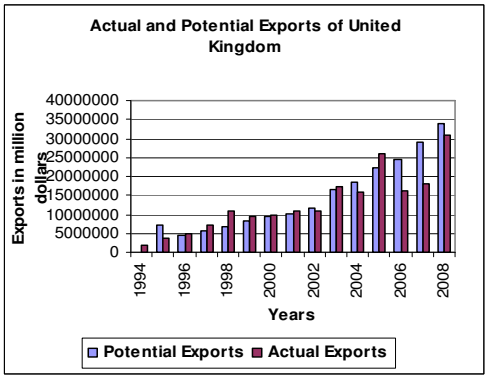
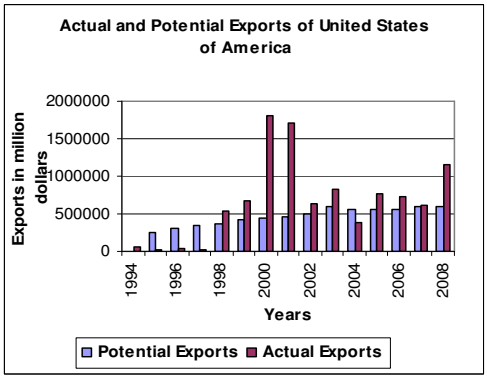


Figure 1-37: Actual and Potential Exports



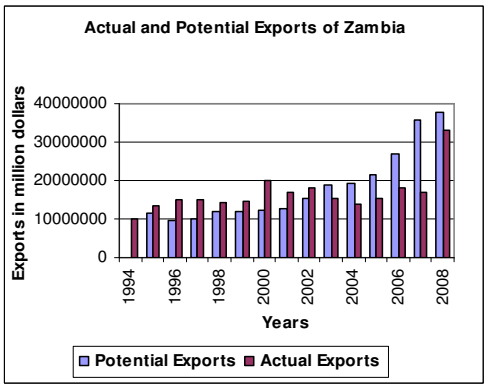


Table A2: Actual and Potential exports

	Angola		Argentina		Australia		Austria	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		213043		16687555		21318636		28592570
1995	981041.46	463138	11258568	20743188	16709033	43056352	24865951	58192415
1996	1160602.7	1071482	9647120.2	12596971	15921962	37140880	26916230	42107274
1997	1541829.1	934567	10685839	13111577	18789899	30266627	28004338	32104289
1998	1799573	805480	11278062	14817227	18465967	41922966	25728760	29759350
1999	1762458	1154288	12407231	13026583	18435892	35414498	28407393	25484879
2000	1806117.4	1461879	12280584	20536295	20034774	33800111	28455727	26065347
2001	2451719.1	1875337	12311447	21174188	19932657	25903986	26067764	28580790
2002	2649840.5	2576069	12745260	6894195	20286983	20736338	26948279	21024563
2003	3833964.7	6113034	7393043.1	7799811	25784394	21699349	32830220	32824356
2004	4172934.2	6983275	7808707.4	13519892	27802041	19645027	34338578	37048341
2005	5201616.5	8892686	8216459.9	9297327	29896142	15677684	34683340	27731927
2006	7264136.6	11442772	9187000	5955072	32343383	11250725	35346502	29132642
2007	10056905	11362868	10362147	4554298	33956471	13937330	37162844	44118253
2008	12268554	15187608	11588920	5679479	37457593	22754723	38926274	31480997

	Belgium		Cameroon		Central African Rep		China	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		11404959		829388		2295937		253241
1995	17693006	13313930	1572095.5	329516	434499.47	2537882	113624	
1996	21536290	12765405	1948694.1	1064333	514931.93	3108889	154592.82	446
1997	22261293	9396284	2250268.3	835778	525155.66	1464449	185440.62	608457
1998	20856162	15024826	2247704.4	1677898	537245.26	2533641	199581.91	1716134
1999	22590274	19553089	2555555.1	1344871	617503.49	1368507	225692.79	130513
2000	22596148	35349913	2709568.6	2529581	648352.62	2748284	241040.44	1759788
2001	21223296	25121664	2635886.2	5627204	603897.64	1093960	255689.73	2458395
2002	22003674	34559693	2935886.5	4556274	647542.69	422668	285417.99	2023629
2003	26923229	29937345	3925404.7	5004551	808527.52	189056	358839.32	246936
2004	28282675	25588611	4277160.9	5450022	808535.61	92127	355482.04	212648
2005	28753498	26435932	4544598.8	5199067	829741.93	35052	365876.09	262692
2006	29218423	67281186	4760627.3	6340379		237921	407025.05	199460
2007	30180301	36236993	5218027.4	5641935		1381822	469855.27	834280
2008	32154405	27421353	5650587	8595323		85723	521883.68	86042

	Democratic Rep Congo		France		Germany		Ghana	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		2855099		21609308		25712675		462274
1995	3796195.7	5149526	10865683	40804651	49843567	19767893	3313315.8	1409525
1996	2683386	5533111	10984107	15792949	51612270	28036807	3390337.4	1437147
1997	3554517.9	2579933	11666243	11150270	53388718	42621677	3936293.1	1360664
1998	3414255.4	2889795	10819710	18589459	50000322	44662807	3999340.4	3683249
1999	3062095.4	1889240	11770300	24947915	53688533	43018714	4778322	3254682
2000	2935769	2400255	11957868	20100841	53237309	50531861	5112453.6	6343336
2001	2984939.4	2143535	11010060	10254571	47998965	54062051	3872303.1	5301801
2002	3535905.6	2979851	11703635	12400930	49619775	63419566	4372782.1	6756749
2003	4523289.3	4690339	14597488	16060002	59840904	65562028	5910435.1	10312263
2004	4324555.9	6846288	15086940	11340458	61001560	82217563	6361278.9	9594268
2005	4643458.4	7290065	15488525	13767782	60728277	70995358	6739525	9846621
2006		7383539	15659526	4140410	59193956	59147694	7813237.7	8695032
2007		7821263	16128041	13869841	60393981	69405866	8783890.7	8492793
2008		10602508	17145735	12227895	62848649	73256308	10405863	10471948

	India		Ireland		Israel		Italy	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		13465187		18370		12822273		27051998
1995	20193271	32097421	168596	16362	7136264.4	17724641	21018635	46189072
1996	19625102	15946483	244458	65366	6695994	20233585	24358465	19840193
1997	22728041	14542035	273539	87827	7754702.6	14586972	25974868	21839616
1998	24152779	20299347	285059	65847	8219829.3	12619414	24300318	32705086
1999	26890134	26623797	339854	55288	9158106.5	13085825	26339756	31829670
2000	29680476	41378861	366803	39310	9830201.6	22317689	26270311	33662040
2001	30320663	27655279	367990	167768	10902471	15592620	24240613	54093321
2002	33576266	39663936	419786	141660	11826342	10219505	25954875	29078721
2003	41802220	42839765	572352	1484112	13265404	9703097	31826824	32868189
2004	43171020	56804572	631826	2017758	12714962	9055874	32941704	23939961
2005	45261168	48391959	673282	4321709	12639154	5750819	33224230	24217509
2006	50405457	52190499	703266	3525919	13177877	7381448	32714861	29938948
2007	56872928	61343181	772518	6965641	14287992	7481402	33475018	29874178
2008	63698400	60699265	836264	6447827	15178644	6264380	34709709	21845569

	Japan		Kenya		Kuwait		Madagascar	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		31264544		3883853		28452		2729358
1995	13852829	59771782	9538721.3	9371693	327787.23	41255	4288338.8	3373496
1996	13266863	38111110	9475594	9482161	370022.84	755465	3636310	4185649
1997	12690700	28608864	10541179	11016634	414811.72	40787	4761293.8	4980875
1998	11727300	21838536	11746079	12894551	404270.71	219675	4537151.7	3823715
1999	11818894	17282347	13554376	7331049	420903.98	118535	5399246.7	3781484
2000	13074182	21190293	13789941	10722442	509691.03	26064	5741206.9	4954708
2001	13477740	12047003	13610743	13490281	600543.29	928952	6143099.6	5261823
2002	12736214	10209791	15588281	13970661	568337.1	1281690	7553185.9	8071441
2003	14173010	10195979	18730617	20505066	749761.17	2404017	8974250.7	7756423
2004	13550717	16075010	19322678	19612286	845826.89	2053221	9693828.5	9922369
2005	13190402	8738235	19636095	25041486	992785.59	2009125	7955945	12932667
2006	12608226	4356672	21947417	20761505	1384819	2820938	8992576.8	8799696
2007	12086987	6564242	26173814	27916625	1908732.6	3337483	10040224	10759856
2008	11481183	5255620	29388676	48338967	2166470.7	7142061	12435925	14537942

	Malawi		Mauritius		Mozambique		Netherlands	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		9213368		8201849		58667298		1937020
1995	5262253.9	9560124	6212227	10123774	8008387.6	10294944	2195169.9	1199635
1996	4692565.5	7992367	6403402.2	8063592	7053397.7	8592023	2660673.9	1343001
1997	7260795.8	7963287	7421264.4	9166490	9242102.9	11222504	2867124	968946
1998	8283532	9859655	7138976.7	8444636	10897130	10415871	2729339	4277651
1999	6950193.1	6624194	7856486.1	6714524	13509585	17531717	3055243.9	2378635
2000	7544429.2	7521078	8101258.7	6771735	14443572	13039628	3116371.8	3457602
2001	7734875.9	7241368	8500792.9	6705773	14395698	10481210	2976206.3	2194589
2002	8396369.8	6997449	8932081.4	9168307	15109587	11986739	3178659.1	5748252
2003	11121047	9280772	10814734	12631040	19753475	18156932	3976171.6	3257156
2004	9768466	8971234	11076430	12138094	20795351	20321415	4170890	2367247
2005	9977468.9	8340024	11297364	16712067	22993911	28142276	4179323.7	3163623
2006	10821441	8104667	10960078	10698964	25449840	30912792	4240747	4412862
2007	11373311	9255831	11324737	6813108	27543304	25124454	4377157.1	11761474
2008	12445877	19362906	12144537	10339318	29397788	25226297	4581559.5	15119107

	Nigeria		New Zealand		Republic of Korea		Saudi Arabia	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		4527048		2341372		14544615		262603
1995	17012008	7991395	4746746	10106948	5388782.3	21295632	2924926.8	1007444
1996	7510330	9083029	4895025	5639300	5193560.2	9134605	2847295.1	1738196
1997	10668756	3891389	5622067	4679525	5845192	22995944	3388202.2	1540536
1998	11162160	9667361	5716286	4635669	5538033.3	6715203	3569442.6	1909777
1999	12024178	18084629	5474053	3965733	4478237	8472351	3670909.5	4664151
2000	13276419	15785027	5681466	2421006	5435108.3	11387923	4131867.3	6728464
2001	15836216	16738497	5328604	2612029	6021458.1	1610738	4724111.2	7780382
2002	18772245	19211891	5488634	2570464	6102017.4	3691461	5080041.6	3549456
2003	22352752	24811690	7309460	6323172	7823245.1	3477624	6184211.1	7317960
2004	24197503	26089768	8124867	13133325	7482593.4	3142231	6379689.6	10128291
2005	26775022	30090571	8996804	13969228		2328018	6773713.4	4378035
2006	34767027	26752111	9534525	16844868		6279386	8005264.9	10195141
2007	41178219	41335588	9559920	19540101		18646176	9147397.8	12041747
2008	44142341	58478525	10629886	24304894		32510335	9491336.6	13111159

	Spain		Taiwan		Tanzania		United Arab Emirates	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		17646071		42833350		33531939		1705386
1995	20293070	28025952	32921615	70004196	16755381	60080364	3742932.7	2604459
1996	23773688	28522422	33863558	55893697	18625087	33834552	4243971.2	2110322
1997	25369799	22998491	36850509	53791669	23131827	33201227	4629965.6	1867384
1998	24010937	27759637	37864328	51132103	26152883	28725707	4835427	3774697
1999	27093110	23201695	37926476	67626387	30180301	20721811	4973030.6	3083564
2000	27835980	41102404	40550148	64440514	31722920	34350996	5101881.7	5713139
2001	26173814	48619192	42766259	49668341	32325599	25727229	4907818	8248495
2002	28640146	36773703	41450894	23562338	35193079	21808734	5243501.2	4180999
2003	37989106	33532583	49215541	31805902	42242188	33841483	6485698	11389231
2004	41229724	27879786	45381269	29456347	38937564	37930256	6107328.5	12085854
2005	44158235	26940514	44834568	46674213	38888534	28000776	6486995.3	12234739
2006	46780172	30848713	45544025	31331553	39361156	56405337	7221837.6	7765448
2007	51089523	37941512	46821357	36622242	39638840	47823588	7776601.7	8075754
2008	55106046	81912557	46871483	32131603	41640341	40606504	8634531.4	8073849

	Uganda		United Kingdom		United States of America		Zambia	
	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports	Potential Exports	Actual Exports
Year								
1994		51671160		1988984		60223		9946598
1995	31233444	88321554	7180215.8	3600473	252182.93	18308	11538271	13539148
1996	26053691	43548010	4633532.1	4791979	311741.63	30634	9560207.6	14821077
1997	31273761	49878877	5624485.3	7300464	351994.21	22969	10124310	14968648
1998	34049980	43097625	6677071.2	11128337	368287.81	541957	11971867	14263720
1999	36732776	57059969	8188080	9294928	414061.59	669573	11737390	14669866
2000	43039980	62211627	9445415	9815872	444146.61	1807644	12221411	20039045
2001	54419875	51467732	10257298	10756987	463689.3	1715064	12772947	17073062
2002	59116463	56467222	11853811	11083928	501906.94	641288	15256253	17968664
2003	75570005	46820433	16587998	17415306	601565.08	834338	18680299	15386857
2004	79960234	61041323	18583971	15835928	562788.97	383491	19368527	13699235
2005	88316720	45935382	22266859	26181770	549602.19	761636	21665897	15420054
2006	106085932	73383215	24581385	16096740	563774.71	733326	26780913	18075387
2007	135572892	120506184	29059616	18199809	592751.18	623973	35927731	16948707
2008	152059128	145027803	33953076	30765547	592099.52	1144254	37671711	33032538

	Zimbabwe	
	Potential Exports	Actual Exports
Year		
1994		28070688
1995	42412768	31662248
1996	35821542	39732393
1997	44439977	36360532
1998	44006592	30111953
1999	38272034	30181735
2000	39605953	31140889
2001	37660411	26320043
2002	37834048	17186882
2003	43638485	23650884
2004	20449930	27056606
2005	18295213	37407280
2006	17179717	27316564
2007	16398165	30219210
2008	15246644	29200063