# Determinants of Exports in South Africa

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## 1.0 Introduction

This paper reviews several studies of the determinants of exports in South Africa in the light of the policy directions, which have emphasised the importance of an export led growth path for the economy. Major trading partners and the composition of trade are examined as are the role of the real exchange rate, capital intensity, research and development, export incentives and the vent for surplus theories of export behaviour.

## 2.0 Composition and Direction of Exports

### 2.1 Composition of Exports

Table 1 shows that in 1990, 89 per cent of mining production was exported, 10 per cent of agricultural production and only 13 per cent of manufacturing production. Within manufacturing, iron and steel, non ferrous metals, clothing, textiles and glass provided an above average share of their domestic production for the foreign market. The propensity to export in the manufacturing sector is rather low demonstrating the direction of trade policy towards import substitution rather than the encouragement of exports. South Africa is essentially a primary good exporter. If mining derivative exports are included with the mining exports it is clear that comparative advantage lies in what has been termed the minerals - energy complex (Fine and Rustomjee, 1996).

If gold is excluded from total exports, 26,5 per cent of total exports were primary products in the form of food, raw materials, ores and minerals, fuels and non-ferrous metals. Other exports that include gold, arms and ammunition (unclassified by source) form 41 per cent of total exports. Manufactures make up the difference with 32,5 per cent of total exports.

In a recent study of the composition of exports Hirsch (1993) noted that the largest increase in manufactured exports took place in 1990, the year of the introduction of the GEIS and

the first year of the recession. Although exports increased in all categories of manufactures, the most notable increase of 71 per cent occurred in machinery and transport equipment over a two - year period. Hirsch observes that

**Table 1: Exports by Economic Sector**

| **Sector** | **Exports 1991 (R bn)** | **Exports as % of production 1990** |
|---|---|---|
| **Agriculture** | 2.3 | 10 |
| **Mining** | 13.8 | 89 |
| **Manufacturing:** | 22.6 | 13 |
| Food | 2.7 | 8 |
| Beverages | 0.3 | 4 |
| Tobacco | 0.0 | 7 |
| Textiles | 1.2 | 20 |
| Clothing | 0.2 | 24 |
| Leather | 0.2 | 17 |
| Footwear | 0.0 | 9 |
| Wood | 0.3 | 12 |
| Furniture | 0.1 | 11 |
| Paper | 1.6 | 11 |
| Printing | 0.1 | 2 |
| Industrial Chemicals | 2.6 | 12 |
| Other Chemicals | 0.4 | 6 |
| Rubber | 0.1 | 5 |
| Plastic | 0.1 | 2 |
| Pottery | 0.0 | 3 |
| Glass | 0.1 | 17 |
| Other Nonmetallics | 0.4 | 7 |
| Iron & Steel | 5.9 | 37 |
| Non – ferrous | 1.8 | 36 |
| Metal Products | 1.4 | 6 |
| Machinery | 1.2 | 10 |
| Electrical Machinery | 0.4 | 4 |
| Motor Vehicles | 0.9 | 5 |
| Other Transport | 0.3 | 24 |
| Other Manuf | 0.3 | 34 |
| **Unclassified** | 26.2 | |

Source: Industrial Development Corporation Sectoral Data Series 1990 and GATT Trade Review, 1993.

As a proportion of world trade, South Africa's export share in primary products has declined from 0,783 in 1988 to 0,701 in 1990, while its export share in manufactures increased from 0,293 in 1988 to 0,339 in 1990.

Bearing in mind the incentives that have been created under the auspices of the GEIS, it isn't surprising that machinery and capital goods exports have flourished. The interesting question is whether these exports would occur in the absence of the GEIS and in the climate of a buoyant economy. The World Bank (Fallon, 1993) is of the view that for a broad range of exports the GEIS has been fundamental in sustaining their performance.

Levy (1991) contributes to the debate on the relationship between export growth and employment in South Africa by questioning whether export led growth in and of itself will stimulate employment growth. Levy suggests that as iron and steel, selected basic chemicals, non-ferrous metals and pulp and paper products account for 49 per cent of manufacturing exports that are highly capital intensive, export growth may not be as employment creating as we would expect in an apparently labour abundant economy.

**Table 3: Export Propensity and Capital Intensity (% value added)**

**Capital per Worker**

| Export Propensity | Under R10000 | R10000 - R19000 | R20000 - R49000 | R50000 + | All Sectors |
|---|---|---|---|---|---|
| Low | 28.7 | 42.7 | 46.5 | 31.0 | 36.5 |
| Medium | 30.0 | 27.4 | 39.7 | 13.5 | 25.9 |
| High | 41.3 | 23.9 | 13.8 | 55.5 | 37.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Notes: (a) Low export propensity exports consist of less than 5 % of subsector output, medium export propensity 5 - 14 % of output and high export propensity 15 % and above.

(b) Source: Levy (1991).

Table 3 shows that for high levels of export propensity the proportion of value added declines as capital intensity rises. At R50000 per worker the proportion of value added originating in the high export propensity grouping rises. Conversely, low propensities to export were associated with rising proportions of value added up to R50000. Significantly, at the R50000 grouping the export propensities are reversed. Medium levels of export propensity displayed a more erratic relationship with capital intensity. The explanation for these results probably lies in the development of certain strategic industries during the apartheid years. These industries are both capital intensive and have become major exporters. By providing selective encouragement to these capital-intensive industries the economy was placed on a path towards creating fewer jobs. If export incentives and industrialisation policy had been less selective and more uniform the market would have ensured a more labour intensive pattern of growth. This pattern has observed for those industries where capital intensity was less than R50000 per worker.

Scerri (1990) examines the role of research and development in conjunction with that of physical and human capital, and labour. This study shows that the level of capital intensity is positively and significantly related to the share of net exports in sales, while the proportion of human capital in total labour is negatively correlated. When the share of research and development expenditures are included in the regressions R and D expenditures were found to be negatively correlated with net exports. Scerri therefore concludes that comparative advantage in manufacturing is to be found in capital intensive industries, which employ a relatively low level of human capital and research and development. As this study focussed on data for the late seventies and early eighties it could be argued that the characteristics of manufactured exports may have changed and should therefore form part of a future research agenda.

## 2.2 Export Markets and their Determinants

Table 2 shows the major markets for exports for 1993 and 1996. Zimbabwe and Mozambique moved up in the ranks of major trading partners. However, the bulk of trade continues to be conducted with OECD countries. If gold were included in these exports the importance of the OECD countries would be heightened particularly as this trade is conducted in dollars.

**Table 2: Major Export Markets: 1993 and 1996**

| **Market** | **Exports 1993** | **Market** | **Exports 1996** |
|---|---|---|---|
| Switzerland | 7606.1 | United Kingdom | 13748.5 |
| United Kingdom | 3943.2 | United States | 9903.0 |
| United States | 3480.4 | Japan | 8782.2 |
| Japan | 3132.1 | Zimbabwe | 6215.0 |
| Germany | 2724.3 | Germany | 5994.1 |
| Belgium | 2310.1 | Netherlands | 3578.3 |
| Taiwan | 2165.5 | Belgium | 3446.6 |
| Netherlands | 2076.9 | Taiwan | 3289.2 |
| Zimbabwe | 1745.2 | Switzerland | 3269.2 |
| Hong Kong | 1701.2 | Korea | 2858.5 |
| Israel | 1680.2 | Italy | 2704.6 |
| Italy | 1431.7 | Spain | 2587.9 |
| Zambia | 1305.9 | Hong Kong | 2586.7 |
| Korea | 1274.7 | Mozambique | 2251.9 |
| Mozambique | 961.6 | France | 2045.5 |
| Spain | 938.8 | Singapore | 1803.5 |
| France | 758.9 | Brazil | 1759.3 |
| China | 597.4 | Israel | 1671.8 |

| | | | |
|---|---|---|---|
| Malawi | 591.7 | Zambia | 1663.7 |
| Norway | 568.9 | Australia | 1644.6 |

A model explaining the direction of trade on the basis of trading partners' size, location and income was recently developed in the context of establishing whether regional groupings had played a role in South Africa's pattern of trade A variant of the gravity model was used to test for the determinants of the direction of trade for South Africa.

The research proposed the following model:

$$T_{it} = b_0 + b_1 \ln(GDPPC_{it}) + b_2 \ln(POP_{it}) + b_3 \ln(DIST_{it}) + b_4 (IMPOPE_{it}) +$$

$$b_5 (PTA_{it}) + b_6 (SACU_{it}) + b_7 (SADC_{it}) + b_8 (PREF_{it}) + b_9 (EU_{it}) + b_{10} (US_{it}) + b_{11} (TYPTA_{it})$$

$$++ b_{12} (TYSACU_{it}) + b_{13} (TYSADC_{it}) + b_{14} (TYPREF_{it}) + b_{15} (TYEU_{it}) + b_{16} (TYUS_{it})$$

$$+ b_{17} (D90) + b_{18} (D91) + b_{19} (D92) + b_{20} (D93) + m_{it}$$

$i = 1 \ldots\ldots\ldots\ldots n;$
$t = 1989, \ldots\ldots\ldots 1993$

(1.0)

where i is the ith trading partner and t represents the year. The equation was estimated in logarithmic form. The dependent variable, Tit is South African exports to each trading partner. GDPPC is gross domestic product per capita and population is represented by POP . DIST represents the traditional distance variable. IMPOPE is a variable representing the openness of each trading partner's economy. The construction of this variable is discussed below.

The dummy variables for regional groupings incorporate the Preferential Trading Area (PTA/COMESA), the South African Customs Union (SACU), the Southern African Development Community (SADC), preferential bilateral trading agreements (PREF), the

European Union (EU) and the United States/Canada NAFTA agreement (US). The changing influence of the regional groupings additional dummies is measured by the creation of additional dummies. These are represented by TYPTA, TYSACU, TYSADC, TYPREF, TYUS and TYEU taking the values 1 through 5 from 1989 to 1993. General time dummies to measure the changing effects of sanctions are represented by D90, D91, D92 and D93.

IMPOPE was used to capture differences in trade and exchange rate policy on the part of the trading partners. The variable was constructed by regressing each country's share of imports in gross domestic product on the time dummies, and the natural logarithms of gross domestic product and population. The index of openness is the sum of the time shifts and the residuals. Openness is therefore measured by the extent to which each country deviates from what would have been expected given its level of per capita income and size of population. This measure captures the combined effect of both trade and exchange rate policy on a country's import share.

To measure openness, the following equations were estimated by ordinary least squares.

$$\ln(MGDP_{it}) = \alpha_0 + \alpha_1(D90) + \alpha_2(D91) + \alpha_3(D92) + \alpha_3(D93) + \alpha_4 \ln(GDPPC_{it}) + \alpha_5 \ln(POP_{it}) + \varepsilon_{it} \quad (2.0)$$

*then*

$$IMPOPE_{it} = a_0 + a_1(D90) + a_2(D91) + a_3(D92) + a_4(D93) + e_{it}$$

The model was estimated using South African exports excluding gold and armaments, to one hundred and thirty - six countries over the five year period 1989 to 1993. The availability of data on the essential variables - GDP, exports and imports - determined whether a country was included in the sample. Tobit maximum likelihood estimation was used in place of ordinary least squares as exports to a number of countries were either nonexistent or zero in certain years.

The estimating equation was run for 680 observations on pooled time series cross section data. The major results are shown in Table 3 and show the importance of the role of geographic and economic influences. Merchandise exports are positively related to per capita gross domestic product and population and negatively related distance. South Africa's location at the tip of Africa resulted in transport costs being an important determinant of trade direction. Furthermore, the more open economies were shown to absorb more exports from South Africa. The dummy variables played a minor role in the determination of the direction of exports. Apart from the SACU dummy and the D92 dummy all the other dummies are insignificant indicating that regional groupings had not influenced the direction of exports. In addition, the impact of the regional groupings on purchases of South African goods did not significantly change, despite the raising of sanctions. The gradual lifting of sanctions in the early 1990s is marginally reflected in the positive sign and level of significance of the D92 dummy variable for 1992. In addition, the introduction of the General Export Incentive Scheme in early April 1990 failed to be reflected in the dummy for 1990.

**Table 3: Tobit Estimates for Export Equation 1.0**

| Variable | Estimate | Standard Error | t-Statistic |
|---|---|---|---|
| Constant | 5.79965 | 3.80769 | 1.52314 |
| LnGDPPC | 2.15007** | 0.125812 | 17.0896 |
| ln POP | 1.55085** | 0.082457 | 18.8079 |
| LnDIST | -4.46981** | 0.496619 | -9.00049 |
| IMPOPE | 1.89368** | 0.2786 | 6.79715 |
| PTA | 1.14207 | 1.37818 | 0.828675 |
| SACU | -14.6751** | 3.38311 | -4.33776 |
| SADC | -0.961565 | 2.83906 | -0.338691 |
| PREF | 1.75656 | 2.92850 | 0.599816 |
| EU | -0.663664 | 1.40994 | -0.470704 |
| US | -1.79317 | 4.16892 | -0.430128 |
| TYPTA | -0.151982 | 0.39170 | 0.383628 |
| TYSACU | 0.783487 | 0.989886 | 0.791493 |
| TYSADC | 0.08914 | 0.850592 | 0.104798 |
| TYPREF | -0.575577 | 0.88054 | -0.653663 |

| | | | |
|---|---|---|---|
| TYEU | 0.00414338 | 0.411731 | 0.010063 |
| TYUS | 0.033601 | 1.24817 | 0.02692 |
| | | | |
| D90 | 0.048906 | 0.483593 | 0.10113 |
| D91 | 0.498860 | 0.493097 | 1.01169 |
| D92 | 0.839198* | 0.508781 | 1.64943 |
| D93 | 0.09335 | 0.529937 | 0.176153 |

****** Significant at 1% level

* Significant at 5% level No. of Observations = 680

Note: Exports, the dependent variable, are estimated in logs for values greater than zero.

The negative sign on the SACU dummy indicates a significant understatement of exports to the SACU countries given their levels of per capita income and population. The difficulties with the recording of intra SACU trade, accounts for this result.

**Table 4: Tobit Estimates for Export Equation 1.0 excluding SACU**

| **Variable** | **Estimate** | **Standard Error** | **t-Statistic** |
|---|---|---|---|
| Constant | 5.15754 | 3.97002 | 1.29912 |
| lnGDPPC | 2.04488** | 0.12684 | 16.12128 |
| lnPOP | 1.59448** | 0.084479 | 18.8743 |
| lnDIST | -3.77748** | 0.509696 | -7.41124 |
| IMPOPE | 1.96093** | 0.28932 | 6.77773 |
| COMESA | 1.90916 | 1.47098 | 1.29788 |
| SADC | -3.63134 | 2.63321 | -1.37905 |
| PREF | 3.79455 | 2.85632 | 1.32847 |
| EU | -0.55133 | 1.44588 | -0.381312 |
| US | -1.82568 | 4.27298 | -0.427261 |
| TYPTA | -0.155392 | 0.422508 | -0.367786 |
| TYSADC | 0.058686 | 0.778035 | 0.075429 |
| TYPREF | -0.564609 | 0.860269 | -0.656317 |
| TYEU | 0.012706 | 0.422261 | 0.030090 |
| TYUS | 0.033079 | 1.27922 | 0.025859 |

| | | | |
|---|---|---|---|
| D90 | 0.176594 | 0.502755 | 0.351252 |
| D91 | 0.532395 | 0.512201 | 1.03943 |
| D92 | 0.881429* | 0.527437 | 1.67115 |
| D93 | 0.155511 | 0.548067 | 0.283744 |

** Significant at the 1 % level
* Significant at the 5 % level

As the SACU data is understated, it was decided to exclude the SACU dummy and apply the Tobit analysis without Lesotho, Swaziland, Namibia and Botswana. The results are shown in Table 4. The exclusion of SACU and the SACU countries has little effect on the overall result. Given that all the SACU countries are contiguous to South Africa, it is interesting that the level of significance of the distance variable is increased and the coefficient decreases in absolute size.

To investigate the nature of the adjustment process, the lagged dependent variable was introduced into the equation. Table 5 shows the results. The time dummies which provide some measure of the overall effect of sanctions, played a more significant role for the years 1991 and 1992 when sanctions gradually relaxed. The coefficient on the 1993 dummy was not estimated due to the existence of multicollinearity. The one year lag proved to be significant and indicated that the adjustment process was only partially completed within a year.

**Table 5: Tobit Estimates for Exports incorporating a lagged dependent variable**

| **Variable** | **Estimate** | **Standand Error** | **t-statistic** |
|---|---|---|---|
| Constant | 3.14406 | 3.36258 | 0.935015 |
| LnGDPPC | 0.895358 | 0.132016 | 6.78216 |
| LnPOP | 0.756888 | 0.086948 | 8.70508 |
| LnDIST | -1.85885 | 0.456315 | -4.07362 |
| IMPOPE | 0.997511 | 0.253292 | 3.93818 |
| PTA | 1.55002 | 1.63594 | 0.947534 |
| SACU | -9.95122 | 4.08806 | -2.43421 |
| SADC | -0.839355 | 3.43788 | -0.244149 |
| PREF | 0.411585 | 3.54681 | 0.116044 |
| EU | -1.32717 | 1.68127 | -0.789382 |

| | | | |
|---|---|---|---|
| US | -2.35993 | 5.03662 | -0.468554 |
| | | | |
| TYPTA | -0.394549 | 0.434066 | -0.90896 |
| TYSACU | 1.42463 | 1.08526 | 1.31271 |
| TYSADC | 0.162675 | 0.931022 | 0.174728 |
| TYPREF | -0.216073 | 0.963818 | -0.224185 |
| TYEU | 0.308098 | 0.450074 | 0.684549 |
| TYUS | 0.458363 | 1.36597 | 0.335557 |
| | | | |
| D90 | 0.582313 | 0.415185 | 1.40254 |
| D91 | 0.8949 | 0.391356 | 2.28666 |
| D92 | 1.00449 | 0.375735 | 2.67341 |
| | | | |
| LnEXPORT(-136) | 0.551252 | 0.036016 | 15.3058 |

** Significant at 1% level
* Significant at 5% level

## 3.0 Export Incentives

At the present time the export incentives remaining in force are duty drawbacks and exemptions to exporters, the reduced level of GEIS, limited low interest IDC loans, export credit re-insurance, discounted electricity, export marketing assistance and newer WTO- friendly supply side measures that will be discussed below.

Exporters can only use the drawbacks and exemptions of duty if they can show why duty free imports will aid the export effort. These incentives are not available automatically, and furthermore, if exporters availed themselves of the GEIS they were not allowed to use the drawbacks and exemptions.

When the GEIS was first introduced the cash grant under the GEIS was larger depending on the degree of processing and the local content. It has been estimated that by value 33 per cent of export trade qualified for assistance under the GEIS (Davis, 1993). Bearing in

mind that gold and precious metals and stones, certain maize, petroleum products, uranium, motor vehicles and parts were excluded from the benefits of the GEIS it is clear that most of manufacturing industry is included. Clothing, carpets, footwear, fabricated metals, machinery and appliances received the maximum 19,5 per cent, and sectors such as chemicals and certain food processing sectors, a low of 2 per cent (Davis, 1993).

However, the GEIS has been gradually phased out. In 1994 benefits to Category 2, beneficiated primary products were eliminated. Benefits in Category 3, material intensive products were reduced to 3 per cent from 12.5 per cent, and Category 4, manufactured products from 25 per cent to 14 per cent. The phase down of the GEIS has accelerated in 1996 with the announcement by the Department of Trade and Industry that as from July 1 the payout on Category 4 will be reduced from 12 per cent of 1996 to 6 per cent and Category 3 presently at 2 per cent to zero per cent. The GEIS will be finally terminated in December 1997.

The reasons for the phase out of the GEIS that have been given by the Department of Trade and Industry are as follows:

1. Anti - export bias has been reduced by a number of measures including the reduction in tariffs and supply side measures
2. The incompatibility of the GEIS with GATT obligations
3. The possible ineffectiveness of GEIS
4. Fiscal constraints

The Supply - Side Programmes that are in place at the present time are as follows:

1. Support Programme for Industrial Innovation
2. Technical and Human Resources for Industrial Progress
3. Small Business Development Programmes
4. Export Marketing Assistance
5. National Investment Promotion Agency

6. Competitiveness Fund
7. Pre-Shipment Export Guarantee Scheme
8. Low interest finance for the promotion of exports available of with investment greater than R1 million with 30 per cent or more of production directed at exports.
9. Duty credit certificate scheme for exporters of textiles and clothing.
10. Motor Industry Development Programme

In addition, research according to industry clusters is ongoing. This research will enable each cluster to identify specific areas for funding. The Department of Trade and Industry has allocated R181m to fund programmes that can be shown to be sustainable. It is felt that a scheme such as the GEIS was not sustainable as it was not developing the capacity for exporting without continual funding.

Several criticisms have been levelled at the GEIS. Firstly, it is contrary to the rules of the WTO that of course is not to say that the supply measures that are now in place may also be considered unfriendly if exporters are successful in penetrating foreign markets. Secondly, and more fundamentally, the GEIS created the opportunity for corruption in the form of firms importing goods and adding large mark - ups to claim local content under the GEIS, overinvoicing exports and finally, exporting goods of little value at high prices then re-importing in a different form with low prices. These considerations combined with the cut in allocated expenditure to the Department of Trade and Industry in 1996 has hastened the demise of the GEIS.

If the GEIS had not stimulated investment in export capacity then the view of the Department of Trade and Industry is justified. Their view is supported by a cross country study by Levine and Renelt (1992) who upon finding strong correlations between investment and trade concluded that the beneficial effects of trade reform operate rather through greater resource accumulation rather than through the price mechanism and a more efficient allocation of resources. Of course it isn't sufficient to observe greater investment in traded goods and then conclude that prices had been unimportant in stimulating investment in export capacity.

## 4.0 Anti - Export Bias

The bias inherent in a trade regime has been shown to transfer resources either in the direction of import substitution or export promotion activities in the economy. Measures of bias in economies have been calculated in order to ascertain firstly the orientation of the whole economy , and secondly, at the micro level to establish how an individual industry is orientated. The bias of a regime measures the extent to which domestic and international prices provide incentives, which differ from those that, are faced by firms under free trade.

In many countries it has been difficult to obtain reliable data in order to measure bias. In the case of South Africa it has been particularly difficult to measure bias given the paucity of data on prices and the various incentive measures which have been adopted. Therefore, using a methodology developed by Greenaway and Milner (1987) the incidence of protection was estimated for South Africa for the period 1974 to 1987 (Holden, 1992). This analysis is general equilibrium in nature and estimates the extent to which a tariff changes the relative prices of importables to exportables and nontradables. The results indicate that when the price of gold is included in the price of exports, a substantial proportion of the protection given to importables is shifted in the form of an implicit tax onto exportables. When gold is not included,only 34 per cent of the protection given to importables is shifted onto manufacturing exportables. It is therefore, not surprising, that prior to the real depreciation of the rand in 1984 and 1985, manufactured exports failed to perform (Holden, 1990). These results also accord with the estimates of effective protection which were made by the Industrial Development Corporation where the average rate of effective protection granted to the manufacturing sector was 30 per cent., i.e. domestic value added in manufacturing was increased by 30 per cent as a result of the tariff structure. A further study at the individual industry level found that when the favourable incentives of the GEIS are combined with the protective structure of tariffs, 27 industries would have found it attractive to produce for the foreign market, and 40 industries would still prefer the domestic market (Holden, 1993).

In a recent study on the changes in 'true' protection and subsidy rates incorporating the Uruguay Round offer and the elimination of the GEIS (Holden, 1995), the conclusion is reached that even though import tariffs are reduced with the elimination of the GEIS the economy still maintains a strong measure of anti export bias. The true rate of protection and subsidy namely t* and s* calculated in this study are shown in Table 6. These have been calculated to show the effect of the GATT offer on the true values.

**Table 6: True Protection and Subsidy Rates**

| Trade Regime | t* (%) | s* (%) |
|---|---|---|
| Pre - GATT | 1.6 | -5.03 |
| Post - GATT | 2.4 | -7.5 |

The estimated incidence parameter, the average nominal rates of protection for manufacturing and the average rates of subsidy under the GEIS were used to calculate the true rates. The average import tariff rates before and after the GATT agreement are 16.6 and 10.81 per cent respectively, and the average rate of subsidy under the GEIS was 9 per cent (See GATT Trade Review, 1993). Even though tariffs have been cut, because the GEIS is also eliminated, less pressure is placed on the price of nontradables, and therefore the true rate of protection actually rises. As is to be expected, the bias against exports, in terms of increasing the negative subsidy to exporters, rises from -5.03 to -7.5 per cent. The study concludes that positive import protection combined with an increase in the price of nontradables, and, the elimination of the cash subsidy may well discourage the production of exports unless bias against exports can be reduced by other measures. Clearly, a further reduction in import tariffs would also reduce anti - export bias.

Recently, the IDC (1997) calculated effective rates of protection given to importables and exportables. Table 7 shows the results of their calculations for the economy and manufacturing.

**Table7: Anti-export bias (including Export incentives)**

| | 1993 | 1996 | 1999 |
|---|---|---|---|
| Total Economy | 1.19 | 1.32 | 1.32 |
| Total Manufacturing | 1.27 | 1.45 | 1.44 |

In 1993 high import tariffs averaging 16 per cent were partially counterbalanced by the GEIS (12 per cent), Articles 470.03 and 521.00 and transport rebates. The anti-export bias coefficient is calculated to be 1.19 for the economy and 1.27 for manufacturing. The lowering of import tariffs and the rationalisation of the tariff schedule coupled with the reduction in GEIS benefits results in an increase in the coefficient to 1.32 in both 1996 and 1999 for the economy. Whereas in manufacturing the coefficient rises to 1.45 in 1996 and 1.44 in 1999. Although the IDC calculations confirm the results from the earlier incidence study of the direction of change in anti-export bias, they do indicate a greater degree of bias against exports.

It is difficult to quantify the effects of the new supply measures on anti - export bias. An indication of the extent of resources to be used on these supply side measures are the amounts spent. During 1995/6 the Department of Trade and Industry spent R364m on the export credit reinsurance scheme and export trade promotion, R80m on small business development and R8m on export marketing assistance. These amounts must be compared against R1883m spent on GEIS and R850m on the Regional Industrial Development Programme during the same period.

## 5.0 Productivity and Exports

The link between productivity and trade was explored on a subsectoral basis for the manufacturing sector in South Africa for the period 1973 to 1993 in a recent study (Holden, 1996). The approach incorporates imperfect competition, returns to scale and research and development effects. Using an approach developed by Harrison (1994) and Harrison and Revenga (1995), the production function for each subsector at the four digit level was given by:

$$dy = B_0 + B_1\{a_l(dl - dk) + a_m(dm - dk)\} + B_2 dk$$

$$+B_3 IMPN + B_4\{\alpha_l(dl-dk)+\alpha_m(dm-dk)\}IMPN$$

$$+B_5 XPD + B_6\{\alpha_l(dl-dk)+\alpha_m(dl-dk)\}XPD + B_7 RND$$

The variables y, l, m and k are the natural logarithms of the subsector specific real output, labour, material inputs and capital stock. The variable IMPN is the import penetration ratio measured as the ratio of imports to domestic demand. XPD is the ratio of exports to production. RND is research and development measured by a proxy for these expenditures. The proportion of skilled workers in the subsector labour force was used as an indicator under the assumption that skilled workers are required in order to implement the more advanced technologies in the production process. All the data for the variables was obtained from the Industrial Development Corporation Sectoral Data Base for the period 1970 to 1993.

The degree to which the coefficient $B_1$ exceeds one is a measure of market power, or the ability of firms in the subsector to mark up their prices. The coefficient $B_2$ measures the returns to scale where if the coefficient is unity there are constant returns to scale, and if the coefficient is greater than one there are increasing returns. The coefficients on IMPN, XPD and RND measure the effect of import competition, the share of exports in production and research and development on productivity growth. The terms $B_4$ and $B_6$ are interaction terms that measure the extent to which import competition and export shares have influenced mark- ups or market power.

The results for the manufacturing sector as a whole indicate that there is little exercise of market power overall. Returns to scale in manufacturing are increasing. The trade variables, import penetration and export orientation failed to affect productivity, but the proportion of skilled workers had impacted positively on productivity.

At a lower level of disaggregation the results display interesting differences. The effects of import penetration, to the extent that it occurred under the largely import substituting regime

is mixed. Table 8 groups together those industries where the coefficient on the import penetration variable was significant but either negative or positive.

**Table 8: Import Penetration Effect**

| Positive Coefficient | Negative Coefficient |
|---|---|
| Medicines | Clothing |
| Malt | Spinning |
| Clay | Other Paper Products |
| Animal Feeds | Oils |
| Other Chemicals | Fertilisers |
| | Cocoa Products |
| | Other Basic Chemicals |
| | Agricultural Machinery & Equip. |

The growth in productivity was adversely affected by greater import penetration in eight industries including the clothing industry. Only five industries experienced improvements in productivity as a result of greater import penetration.

The effects of greater export orientation on the growth in productivity was only felt in a minority of industries. These are shown in Table 9. Of the few industries where productivity was affected by changes in export orientation, six experienced an increase productivity growth as the proportion of output exported increased. On the other hand, five industries including the important motor vehicle industry, experienced a decrease in the rate of productivity increase. As many exporters in South Africa are known to export when the economy is depressed it is not surprising that in industries such as clothing, footwear and motor vehicles productivity growth was observed to be lower when the proportion of output exported grew. This finding highlights the problem of establishing the direction of causality between the variables included in this model.

**Table 9: Export Orientation**

| Positive Coefficient | Negative Coefficient |
|---|---|
| Other Metals | Jewellery |
| Grain Products | Motor Vehicles |
| Other Basic Chemicals | Clothing |
| Iron and Steel | Radio and TV |
| Agricultural Machinery &Equipment | Footwear |
| Structural Clay Products | |

The coefficient on the economies of scale variable was found to be greater than one, in twenty four industries. These increasing returns were found in motor vehicles, knitting, clothing, machinery and iron and steel manufacture. Although decreasing returns were found in forty two industries, overall increasing returns were found to prevail in the manufacturing sector as a whole. The importance of a larger market both domestic and foreign, therefore has important implications for the costs of production in the manufacturing sector.

Significantly, market power was used in twenty nine industries. These industries included motor vehicles, knitting, spinning, pulp, carpets, other chemicals and more importantly due to its upstream position, iron and steel. The exploitation of such market power would have impeded the competitive position of the downstream domestic users of iron and steel, knitting and spinning products. Seventeen of the industries that exercised market power have been classified as exhibiting high concentration in the period 1982 to 1988 (Fourie and Smith, 1993). These results provide prima facie evidence that in the case of South Africa bigness has been associated with monopoly pricing policies. However, many firms in motor vehicles, knitting and clothing also enjoyed economies of scale in production. A notable exception to this was in the machinery subsector where protection was low, economies of scale high and market power was not exercised.

The import penetration and export orientation interaction terms provided mixed results. Six industries, including motor vehicles and footwear decreased mark up as a result of rising import penetration ratios. Only three industries actually increased mark up. Greater export orientation had the effect of decreasing mark up in three industries including motor vehicles. Mark up in eight industries was increased as a result of greater export orientation. Clothing, footwear and carpets were among those industries that increased mark up as the proportion of output exported rose.

The proxy for research and development, namely the proportion of skilled workers in the labour force yielded mixed results. Eight industries experienced positive effects on productivity from an increase in the proportion of skilled workers while ten industries experienced negative effects. Using panel data up to 1983 Scerri (1990) concludes that South African manufacturing industries failed to compete internationally in technology intensive commodities lending support to the results obtained in this analysis.

## 6.0 Other Determinants of Exports

Policy makers can use the exchange rate in one of two different ways. The exchange rate can either be directed at achieving a real target, such as maintaining competitiveness, the trade balance and employment, or it can used domestically as a nominal anchor for the price level. Exchange rate policy in South Africa when focused on a real target has aimed to maintain the competitiveness of the gold mining industry. Whereas if the exchange rate had been used as a nominal anchor, it would in a sense have been precommitted with government policy leading the private sector to reduce the rate of inflation. Over the past two decades major shocks in the form of gold price changes, and capital outflows emanating from political crises, have complicated the management of the exchange rate and blurred the objectives of exchange rate policy. The interests of this study relate to the role of the real exchange rate in maintaining the competitiveness of manufactured exportables.

The real exchange rate in South Africa has been driven largely by the price of gold through changes in the terms of trade and capital flows (Gerson and Kahn, 1985, Mainardi, 1995)

For example the sharp rise in the price of gold over the late seventies led to an appreciation in the nominal exchange rate and an increase in the price of nontraded goods. This real appreciation would have squeezed the profitability of import - substituting firms and exporting firms. On the other hand, the real depreciations of the eighties were particularly helpful to the producers of tradables.

During the late seventies and early eighties the variability of real rates exceeded that of nominal exchange rates (Holden, 1985). Since 1985 the real exchange rate has been relatively stable while the nominal rate has steadily depreciated. As changes in exchange rates have been shown to influence the movement of resources into and out of the production of tradables, it is in this light that the variability in rates must be viewed.

### 6.1 The Determinants of Exports in Aggregate

Econometric evidence for South Africa supports the view that real exchange rates have played a role in influencing the volume of exports and imports. Holden (1985) in a demand and supply model for manufacturing exports and nongold mining exports concludes that the effective exchange rate is a highly significant determinant of the demand for exports. The model shows that a nominal depreciation by raising the domestic currency price of exports expands the supply of exports. The increase in the price of exports in the model represents a real depreciation. The elasticities of supply for manufacturing (2.29) and nongold mining exports (0.19) accord with expectations that nontraditional exports are more sensitive to changes in price. However, manufacturing exports were found to be positively related to the extent of excess capacity in the South African economy. On the other hand, nongold mining exports failed to be affected by the state of the economy. However, both manufacturing and nongold mining exports were influenced by the world demand.

In an examination of the determinants of the supply of manufactured exports the World Bank (1994) suggests that although the share of exports in domestic production is sensitive to changes in the real exchange rate, the elasticity of response is low (0.63). Although not strictly comparable with the Holden study, this elasticity estimate when measured as the

response of export volumes to the real exchange rate ranges between 0.63 and 0.72 depending on whether it is assumed that the increase in exports is at the expense of production for the domestic market. Lower capacity utilisation was found to impact positively on the share of production exported, whereas the effect of world demand on the share of production exported was weak. As manufactured exports consist of commodities such as chemicals and iron and steel the world demand for which is declining the Bank is not surprised by this result. However, the analysis also concedes that sanctions played a part in depressing the effect of changes in world demand on South African exports. Given that Holden's work covered the presanctions era, the difference between the role played by world demand in the two analyses can be explained.

Although aggregate manufacturing exports have been shown to be sensitive to changes in the real exchange rate and hence sensitive to changes in prices, whether this translates into greater or lesser sensitivity to the extent of bias against exports has not been established. A future export capacity research agenda should address this question.

### 6.2 Disaggregated Export Determinants

Gouws (1997) while studying the effect of the GEIS on individual industries notes that Balassa (1986) argued that export supply exhibits a significant response to a change in relative prices. Sachs (1989), on the other hand concludes that strong export growth occurs mainly in the presence of large unemployment of domestic resources.. In the South African environment there are not only the normal complexities of determining capacity or appropriate prices, but additional factors such as sanctions, over-invoicing export sales to claim additional export incentives and under-invoicing export sales and over invoicing of imports to avoid the stringent currency controls regulations.

Probably the most important factor on the demand-side, is the level of economic activity in the international markets. In the short-run, as foreign income increases so should the demand for South Africa's products. This is especially true if industrial output increases because most of South African exports are raw materials used as inputs in industry. The trading

partners' capacity to import is important including not only income, but in addition the availability of foreign exchange. However, those countries that have maintained exchange control have also been low income and or slow growing. Therefore, an income variable could well capture the effect of such controls.

Nevertheless Gouws (1997) hypothesises that the most important factors determining the behaviour of the exporter are the profitability of exports in the foreign market and the pressure of domestic demand given that anti-export bias exists. When exporters or manufacturers have faced increased demand in South Africa, the trend has been for them to forsake the foreign markets in favour of the home market. The effect of the subsidies such as the GEIS was to increase the profitability of exports.

Gouws therefore hypothesised that the level of exports is dependent on the price received for the exports (the REER is used as a proxy); the spare capacity available (both capacity utilisation and spare capacity due to lack of demand were tested); the demand for South African exports (the OECD's GDP was used as a proxy); and the export incentive measure (GEIS).

$$X_t = \beta_0 + \beta_1 X_{(t-1)} + \beta_2 GEIS_t + \beta_3 REER_t + \beta_4 CAPUT_t \text{ (or } UUDEM_t) + \beta_5 OECDGDP_t + \varepsilon_t$$

where

$X_t$ is the level of exports;

$GEIS_t$ is the value of export assistance given under the General Export Incentive Scheme;

$REER_t$ is the real effective exchange rate;

$CAPUT_t$ is the capacity utilisation;

$UUDEM_t$ is the spare capacity due to lack of demand; and

$OECDGDP_t$ is the OECD's GDP

The parameters were estimated using Ordinary Least Squares. Similar results were achieved using the Two-Stage Method and the Seemingly Unrelated Regression Method. The Durbin-Watson test was used to test first order auto-correlation. With low Durbin-Watson values, the Breusch-Godfrey Serial Correlation LM Test was used to check for serial correlation and was corrected using autoregression techniques.

**Data Requirements**

(1) The export data used in the Gouws study were obtained from the IDC and aggregated to the three digit SIC level, enabling analysis of 26 manufacturing sectors with quarterly data from 1988 to 1994. It is hoped that with an extended data set to continue modelling export behaviour incorporating adjustment in export behaviour to the changes in the incentive structure.

(2) The GEIS data was obtained from the Department of Trade and Industries database. It was downloaded on a disaggregated basis, using the original HS classifications. These data were converted to SIC using the CSS concordance (conversion) tables. Although it would have been interesting to analyse the growth in category 4 exports, it was not possible to obtain the export data (dependent variable) from the IDC in a disaggregated basis. Sectors were therefore analysed in aggregate and not according to GEIS category. Since GEIS claims take some time to be submitted by the exporter and then to be verified by the Department of Trade and Industry, only data from the inception of the scheme until 1994 were used as this ensured that all claims were covered.

(3) As export prices were only available on an annual basis, it was decided to use the real exchange rate (REER) as a proxy for price. The real effective exchanges rate has been calculated by the Reserve Bank and the IDC. The IDC has calculated the REER per sector for use in their General Equilibrium Model, the IDCGEM. Both series were used and selection depended on which gave the better statistical fit.

(4) The capacity utilisation index is compiled quarterly at a three digit SIC level by CSS.

(5) As South Africa's major trading partners are OECD countries, OECD GDP weighted by trade shares was used.

(6)Certain products are exported seasonally and seasonal dummy variables were used. Sanctions were imposed on certain products that were lifted. A dummy variable is therefore included in selected sectors. The textile industry also benefited from the SAPs. Although no values were put to these, clearly changes in the SAP/duty credit system had an impact on exports. A dummy was therefore used to measure the impact of the "announcement effect".

**Summary Results**

Of the 23 equations estimated, the R-squared exceeded 0,70 for 13 industries and 0,65 for eight. The F-statistic in all cases rejects the hypothesis that the partial slope coefficients are simultaneously equal to zero at the 95 per cent confidence level. The equations with low explanatory power were for the iron and steel and paper industries. Nevertheless, the results would suggest that for the majority of the industrial activities GEIS, REER, capacity utilisation or capacity due to lack of demand, and the OECD's GDP, when taken together, are important determinants of the level of South African exports.

*Summary of findings*

| Sector | GEIS | REER | Capacity utilisation | OECD GDP |
|---|---|---|---|---|
| Food | -0,862 | 522967 | -22784103 | 21492 |
| | (-1,720) | (0,239) | (-4,296) | (1,078) |
| Beverages | -0,734 | 555662 | -1465451 | 37780 |
| | (-0,4418) | (0,8482) | (1,0888) | (5,3675) |
| Tobacco | 44,0202 | 60350 | 54108 | -679,89 |
| | (1,864) | (1,0676) | (0,7716) | (-0,852) |
| Textiles | -0,2913 | 1872831 | -3891188 | -100915 |
| | (-0,1288) | (1,1889) | (-2,1799) | (-7,8113) |
| Clothing | 3,4504 | 307505 | 5597888 | 2958,9 |
| | (1,3947) | (0,3865) | (2,6650) | (0,7867) |
| Footwear | 2,8657 | -138389 | 170258 | 5109,6 |
| | (2,0325) | (-1,698) | (2,6124) | (2,6096) |
| Wood products | -0,5469 | -1266676 | 123426 | 10514,8 |
| | (-05449) | (-3,0693) | (0,1413) | (1,7037) |
| Furniture | 0,0102 | -0,0541 | 0,2394 | 0,6098 |
| | (1,5568) | (-2,2042) | (3,0837) | (04972) |
| Paper and paper | -0,0069 | -0,0875 | -0,1982 | 0,7016 |

| | | | | |
|---|---|---|---|---|
| products | (-1,0904) | (-3,5590) | (-2,3559) | (0,5649) |
| Printing | -0,0678 | -0,0368 | -0,0098 | 0,0006 |
| | (-2,7147) | (-3,0383) | (-0,3351) | (2,6208) |

| Sector | GEIS | REER | Capacity utilisation | OECD GDP |
|---|---|---|---|---|
| Leather products | 0,2091 | -0,5849 | 0,1015 | 0,00798 |
| | (1,5237) | (-2,3337) | (0,3132) | (3,0433) |
| Rubber products | 0,8293 | 681684 | -1530286 | 5859 |
| | (0,3380) | (1,6423) | (-2,3778) | (1,7519) |
| Chemicals | 4,0588 | -11042775 | -11094968 | 539330 |
| | (0,5591) | (-1,3834) | (-1,1507) | (4,4111) |
| Plastic | -0,4106 | 230296 | 137869 | 6088 |
| | (-0,2187) | (0,8316) | (0,6305) | (2,4623) |
| Pottery | -0,1878 | 149313 | 91398 | 742,8 |
| | (-0,5536) | (3,5894) | (1,9319) | (2,342) |
| Non metal | 5,4634 | -295547,8 | 919370 | 13990 |
| | (0,8349) | (-1,0403) | (1,8605) | (3,4633) |
| Iron | 0,7825 | 3210281 | 13422702 | 126146 |
| | (1,2228) | (0,5882) | (1,7061) | (2,4433) |
| Non ferrous | -45,728 | 1642611 | 13303968 | -152878 |
| | (-1,3249) | (2,2432) | (1,7028) | (-0,9912) |
| Metal products | -0,0755 | -1702349 | -92813962 | 46690 |
| | (-0,0427) | (-0,5287) | (-2,9217) | (2,2447) |
| Machinery (excl. electrical) | -0,0087 | -0,0474 | 0,032 | 3,1177 |
| | (-0,9213) | (-0,8277) | (0,1631) | (1,7081) |
| Electrical machinery | 18,8417 | 337374 | 579427 | 38572 |
| | (5,6059) | (0,2959) | (0,5425) | (3,9673) |
| Transport equipment | -0,1740 | 0,1373 | 1,173 | 20,9186 |
| | (-1,8092) | (1,4701) | (1,2998) | (7,0812) |
| Motor vehicles | -0,1409 | 104942 | 8623595 | 87593 |
| | (-0,0847) | (0,4767) | (2,093) | (3,2285) |

t-tests (conducted at both the 95 and 99 per cent levels) on the GEIS variable show that very few of the coefficients are statistically different from zero. This indicates that, with the exception of the tobacco, footwear and electrical machinery industries, GEIS made no significant difference to the level of South African exports. The GEIS variable was found to be significant for leather products, clothing, and furniture at the 90 per cent level.

The capacity utilisation variable on the other hand behaved ambiguously. The coefficient was found to be non-zero in eight sectors. Capacity utilisation was negatively correlated with exports in food, textiles, paper, and metal products. In these industries, it appears that higher exports were associated with lower spare capacity, and they have matured to the status of regular and not vent- for- surplus exporters as anti-export bias has been reduced.

At the disaggregated level the real exchange rate impacted differentially. Although the REER was statistically significant in the wood, furniture, paper, printing, leather, pottery, and

nonferrous metal products industries, pottery and nonferrous metals were found to positively correlated with the REER while the other industries were negatively correlated.

OECD GDP proved to be an important factor in determining the level of South Africa's exports. This is not only the case with primary products, as one would expect but also with manufactured products. The model determined that generally the OECD's GDP was the most common factor influencing South African exports, with exports in sixteen of these industries being driven by economic activity in the OECD. However, one, the textile industry, had the incorrect sign. It would therefore appear that although exports in certain sectors have risen to African countries, the economic conditions in the OECD still remain an important determinant of export performance.

## 6.0 Conclusion

In conclusion there is evidence from the sectoral studies of export behaviour that differs to that found for aggregate manufactured exports. Manufacturing exports have been found to be influenced by the real exchange rate with varying sensitivity. Furthermore, there is evidence of vent –for- surplus behaviour with respect to surplus capacity, and manufactured exports were stimulated by greater foreign economic activity. Productivity improvements failed to be associated with a greater share of exports in production, even though the proportion of skilled workers in an industry impacted positively on manufacturing production. This finding appears to be at variance with work by Scerri (1990) who found that research and development and human capital inputs were not associated with better export performance.

At the sectoral level, there is evidence to suggest that the real exchange rate is not always a determinant of export performance, nor that all industries export their surpluses when domestic demand is depressed. Some industries were found to have enjoyed greater productivity as the proportion of output exported grew. Overwhelmingly however most industries were found to export more when growth in the OECD countries was higher.

On a sectoral basis it was found that the GEIS had not impacted positively in many sectors on exports, despite the calculated reduction in anti-export bias arising from the GEIS. This raises the issue of the credibility of this form of trade policy. Many exporters had not incorporated the GEIS into calculations of profitability rather treating the large payments under the scheme as the proverbial cherry on the top. This finding also suggests that any reduction in anti-export bias can only be achieved through the introduction of credible changes in trade policy.

Schemes such as Section 470.03 with their lack of transparency and time lags involved are not a credible option, nor are export subsidies such as the GEIS. Given the response of exporters to the real exchange rate it may well be that changes in the exchange rate have also been viewed as less than credible by exporters. Therefore, if an export led growth path is envisaged for the economy, then firstly it is important for monetary and fiscal policy to be conducted in such a manner so as to ensure stability in the real exchange rate at an appropriate level. Secondly, it would appear that in order to reduce anti- export bias further tariff liberalisation should be embarked upon. The recent reduction in ad valorem duties on luxury type goods to 15 per cent is a first step in that direction. Even though Customs and Excise have been unable to enforce present tariff structures, this illegal trade liberalisation is neither credible nor sustainable.

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