The nature of South Africa's trade patterns by economic sector, and the extent of trade liberalization during the course of the 1990's[¤]

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ABSTRACT: We explore changing trade protection of the South African economy by means of E¤ective Protection Rates (EPR's). Results on EPR's for 28 manufacturing sectors over the 1988-98 period are presented. Findings suggest that trade liberalization of the South African economy has been less dramatic than is popularly thought. Analyzers proceed to suggest that trade liberalization is di¢cult to associate with increased import penetration of the SA economy, though liberalized sectors do appear to have demonstrated improved export performance.
KEYWORDS: E¤ective Protection Rates, Import Penetration, Export Performance
JEL Classi…cation: F13, F14, F41

1   Introduction

In this paper we examine changing trade patterns in South African economic sectors over the 1970-97 period, but with particular emphasis on the 1990's. Three distinct issues are addressed during the course of our discussion. First, we examine the degree to which South Africa's trade regime has opened up during the course of the 1990's. An oft repeated characterization of the 1990's has been that South Africa experienced signi...cant trade liberalization. We examine whether this perception is borne out by e¤ective rates of protection across all economic sectors, and to what extent di¤erences are present between economic sectors in the extent of their trade liberalization. However we restrict the study to tari¤-based protection and leave aside the issue of non tari¤ barriers to trade.

Trade liberalisation has been an on-going process over the last few decades. South Africa's entrance into world markets has been paralleled with increased access for foreign products to domestic markets. However, the extent of trade liberalisation in South Africa in the last decade remains an area of debate. South Africa's tari¤s cover over 10,000 di¤erent products and tari¤s e¤ect the relative prices at which these goods and services trade. The e¤ects are complex: while the fall in the tari¤ on a ...nished good may hurt a South African ...rm producing that good, the fall in the protection enjoyed by an input may bene...t a number of industries.

This paper quanti...es the extent of trade liberalisation in South Africa using an e¤ective protection rate (EPR) measure. The paper considers changes in the rates of protection in 38 sectors of the South African economy. The EPR of an industry is the protection its output enjoys less the protection a¤orded the inputs of that industry. The EPR therefore measures the shelter that a sector has from international prices and is a proxy for the excess returns that a sector can realize due to protective trade policy.

The next section outlines the theory behind this measure. This is followed by a description of the data used in this study. The sectoral EPRs for the period 1988-98 are then presented and discussed. The change in the penetration of imports over the 1990s is then compared to the ...ndings regarding the change in trade policy stance across sectors.

In the second section of this paper we proceed by examining the extent of import penetration into South Africa's economic sectors. One purpose of such an examination is to establish trade patterns over the full 1970-97 time period for which we have data. The second is to examine whether it

is plausible to suggest that import penetration has shown any change in the light of the suggested process of trade liberalization during the course of the 1990's.

Symmetrically, in the third section of the paper our concern is with the export intensity of South African economic sectors. Again, the discussion covers the full 1970-97 period for which data is available. But once again we focus speci...cally on the transition from the 1980's to the 1990's in order to establish whether the new trade regime has had an impact on the capacity of South African ...rms to penetrate world markets.

Finally, we examine the openness of economic sectors to trade, using the ratio of exports and imports to total output.

2   E¤ective Protection Rates

Many studies have attempted to assess the trade orientation of countries. Edwards (1993) indicates some of the major projects that have compared the protection across countries, sectors and over time. Protection has generally been assessed through the nominal tari¤ level. The structure of these protective measures a¤ects the value added and pro...tability of a particular industry through changing prices of both ...nal goods and intermediate goods in the production process. The overall e¤ect can be assessed through the calculation of e¤ective rates of protection. This measure was pioneered by Corden (1966) and Balassa (1965) - see also Corden (1971,1974). Holden (1999) provides a useful overview of the development of the theory.

The measure captures the rate of protection granted to the value added of an industry. The rate is therefore given by:

$$\rho_j = \frac{VA_j - VA_j^{\pi}}{VA_j^{\pi}} \tag{1}$$

where VA_j denotes the value added at protected prices of producing j, VA_j^{π} denotes the 'world' level of value of added - a proxy for the most e¢cient way of producing j.[1]

It is most common to assume a linear relationship between inputs and outputs with a_{ij} the input-output coe¢cient for the i^0th input for the j^0th

[1]See also Table 2 of Holden (1999:5) which reports some earlier results on EPR's for South Africa, using this measure. Unfortunately the industrial classi...cation used in the cited study does not conform to that avaiable in the data sources used for the present study, limiting the usefulness of any possible comparisons between the computed EPR's.

output. Recognising that inputs to the production process di¤er from intermediates, the EPR for an industry can then be calculate through:

$$\text{¿}_j = \frac{t_j^F \; \text{i} \; \sum_i a_{ij} t_i^I}{1 \; \text{i} \; \sum_i a_{ij}} \tag{2}$$

where t_j the tari¤ level with F indicating ...nal goods, I intermediate goods. This is the most commonly used EPR, though other estimation methods have been employed, taking into account the presence of non-tradable goods, and it is this measure that will be reported in the present analysis.[2]

3   EPR measures for South Africa

The data used for the calculation of the e¤ective protection rates was provided by the Industrial Development Corporation (IDC), Statistics South Africa and the Trade and Industry Policy Secretariat (TIPS). Statistics South Africa calculate input-output tables. A table which identi...ed whether HS codes referred to ...nished goods or to inputs was obtained from the United Nations. The input-output table used here was for 1993 and used the SIC version 3 classi...cation of sectors. The IDC provided the value of imports and duties paid by 8-digit HS codes. There were over 10000 tari¤ lines and the data separated by source of import: SADC, EU and rest of the world. TIPS provided a code conversion table, converting the trade data into SICv3.

Nominal tari¤s by SICv3 sectors were generated ...rst. This was calculated by dividing the total duties collected on imports by sector with the value of total imports.[3] Tari¤ lines were distinguished as either inputs, ...nished goods or either using the UN classi...cation so that nominal tari¤s for ...nished goods and inputs could be calculated for each sector (where the nature of the import could not be identi...ed, it was included in both types). E¤ective protection rates could then be calculated using the input-output table as indicated by

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[2]For a discussion of some further di₵culties with protection measures see Anderson (1998), who suggests a Trade Restrictiveness Index to include non tari¤ barriers to trade. We are prevented from pursung such an extension due to data limitations.

[3]Readers should note that to the extent that the data series reported on duties collected is subject to underreporting, the nominal protection rate computed would be biased downward. Since our interest in this paper is in trends in nominal protection rates, underreporting in duty collection is of reduced concern as long as the underreporting is consistent over time. However, we have no way of verifying the extent of underreporting at any point in time.

equation 2. These were then converted to the smaller number of WEFA sectors by weighting by value of imports.

One problematic aspect of the current measures is the use of the same input-output table for the entire period. One of the reasons for reducing protection is so that relative prices reﬂect economic scarcity, leading production to substitute abundant resources for scarce. This would cause the input coeﬃcients to change over time so changing the EPRs. The use of the same table will ignore this phenomenon and tend to over-estimate the eﬀective protection rates as a consequence.

A second problem noted in the literature regarding the EPR is that it concentrates on tariﬀ barriers ignoring non-tariﬀ barriers. Only recently have methodologies to model the impact of such barriers been devised.[4] These have yet to be applied to South Africa, and in the present context are impossible to develop due to data limitations. Recognition of these limitations of the protection measures computed does imply that the EPR's presented below should be interpreted with the appropriate caveats in mind.

3.1   Analysis of changes in EPRs

3.1.1   Nominal tariﬀ rates

The total duties paid on imports in a sector divided by that sector's total value of imports provides a measure of the nominal tariﬀ. To indicate the extent of tariﬀ reduction a simple summary statistic can be noted. On average, between 1988-93, 4% of the value of imports was collected in duties; for the period 1994-98, this has fallen to 3%.[5]

As HS digit tariﬀ line data was the raw data for the present analysis, the type of good imported can be de...ned quite precisely. In particular, it was possible to identify whether the good imported could be used as a ...nished good or an intermediate good or either. Thus, nominal tariﬀs for both ...nal good imports in a sector and intermediary goods have been calculated. In Table 1, the proportionate changes in the tariﬀ rate between 1994-98 and 1988-93 have been presented for the sectors. Sector de...nitions are identical to the input-output tables used to calculate the eﬀective protection rates, which allowed them to be disaggregated into inter-sectoral ﬂows by SICv3

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[4] See again the discussion in Anderson (1998).

[5] An alternative measure would be the prescribed tariﬀ rate as set by the government. This is not used in the present analysis.

sectors. Thus for instance the table indicates that the nominal tari¤ on ...nal products of agriculture more than doubled between the two periods, while goods which could be used as intermediate inputs faced tari¤s in 1994-98 which were on average only a quarter of those in the earlier period. We reiterate our earlier warning that the nominal protection rates need to be interpreted with care. Thus in the case of Agriculture, for instance, the apparent increase in nominal protection rates is in fact likely to re‡ect a move from non-tari¤ to tari¤ based protection, and may come to conceal what is in e¤ect a net reduction in protection rather than an increase. However, since this is an inherent di¢culty with all protection measures based on tari¤ rates, and our interest here is in the tari¤-based protection measures, we persist with reporting our results for all sectors. Nevertheless, readers should bear in mind that the ...ndings reported require modulation insofar as non-tari¤ barriers were present in the South African economy, and fututre studies extending the analysis to a consideration of non-tari¤ measures should be undertaken.

In terms of the overall trend in nominal tari¤s, there is no signi...cant di¤erence in the changes in nominal tari¤s that imported ...nal goods and intermediate goods face. Clearly, as a measure of trade policy, such averages give little insight as they ignore the e¤ective protection individual sectors enjoy because of the di¤erence between ...nal and intermediate good protection. This is the justi...cation for considering EPR's rather than nominal tari¤s - and it is to this that we now turn.

3.1.2   Overall changes

E¤ective protection rates indicate the e¤ective or net protection a sector enjoys taking into account the tari¤ structure on its output, as well as the protection that its inputs experience. Thus, for instance, where a sector experiences no change in the protection on its output, but the sectors producing the inputs employed for production in that sector are subjected to liberalization, the e¤ective protection of the sector would increase. The same would be true if the trade liberalization on the output of a sector was less pronounced than the liberalization of its inputs.

E¤ective protection rates were calculated for 38 economic sectors for which TIPS made data available and the results for each year are indicated in Table 2. The table orders the sectors by the size of the average GDP over the period 1988-98, in ascending order. The largest single sector - Finance and

SECTOR	Final Output	Intermed. Input	SECTOR	Final Output	Intermed. Input
Agriculture	2.30	0.25	Soap	4.06	8.49
Coal Mining	n.a	n.a	Other chemical products	0.72	0.73
Gold Mining	n.a	n.a	Petrol Re…n & Prod of Petrol/Coal	0.62	0.89
Other Mining (Diamonds & oth)	0.49	0.17	Tyres & tubes	1.02	4.88
Slaughtering	2.06	1.89	Other rubber products	0.63	0.73
Dairy Products	3.18	1.18	Other plastic products	0.73	0.73
Canning & Preserving of Fruit & Veg	1.81	2.21	Pottery	0.86	0.74
Canning	0.24	0.60	Glass & glass products	1.98	0.83
Vegetable & Animal oils & fats	0.56	0.64	Bricks	n.a	0.09
Grain Mill Products	0.15	1.31	Cement	n.a	0.50
Bakery Products	0.84	0.84	Other Non-Metallic Min Prod	0.78	0.93
Sugar Factories & Re…neries	0.92	n.a	Iron & Steel Basic Ind	0.76	0.75
Cocoa	1.31	n.a	Non Ferrous Metal Basic Ind	0.53	.61
Other food products	1.12	1.15	Cutlery	0.67	0.83
Prepared Animal Feeds	1.55	1.55	Furniture & Fixtures Prim of Metal	1.31	1.02
Distilleries & Wineries	1.59	2.88	Structural Metal Products	0.19	0.80
Malt Liquors & Malt	1.87	0.14	Other Fabricated Metal Products	0.56	0.72
Soft Drinks & Carbonated Waters Ind	1.62	2.30	Engines & Turbines	0.64	0.86
Tobacco Products	3.55	0.52	Agricultural Machinery & Equip	0.81	n.a
Spinning	0.89	0.97	Metal & Woodworking Machinery	0.40	0.38
Made-up Textile Goods	0.99	1.08	Special Indus Machin & Equip	0.89	0.47
Garment & Hosiery Knitting Mills	n.a	n.a	O¢ce	0.17	0.06
Other Knitting Mills	0.78	0.71	Other Machinery & Equip	0.72	0.51
Carpets & Rugs	1.19	1.05	Electrical Industrial Machinery & App	0.58	0.16
Cordage	1.01	0.99	Radio	0.54	0.41
Textiles	0.51	0.92	Electrical App & Housewares	0.43	0.80
Wearing Apparel Except Footwear	1.05	1.23	Other Electrical App & Supplies	0.83	0.83
Tanneries & Leather Finishing	0.98	1.00	Motor Vehicles	1.17	2.17
Leather Products & Leather Sub	1.06	1.03	Motor Vehicles Parts & Access	0.38	1.15
Footwear	0.82	0.78	Railway Equipment	0.38	0.18
Wood & wood Products	0.73	0.70	Other Transport	0.42	0.53
Furniture	0.71	0.50	Jewellery & Related Articles	0.43	0.49
Pulp	1.69	1.74	Other Manufacturing Industries	0.45	0.37
Paper Containers	0.69	2.75	Medicinal & Pharmaceutical Prep	0.20	0.42
Other pulp	1.03	0.92	Paints	0.56	0.44
Printing & publishing	1.12	1.07	Synthetic Resins	0.93	0.81
Industrial Chemicals	0.50	0.56	Fertilizers & Pesticides	0.14	0.01
			AVERAGE	0.96	1.04

Table 1: Proportionate change in nominal tari¤, 1988-93 to 1994-98

insurance - can be seen to have enjoyed negative and high rates of e¤ective protection for the entire period.

Table 3 indicates the general changes in the EPRs. The average EPR for 1988-93 was compared with that for the period 1994-98.[6] Each sector has then been classi...ed in one of three categories by the rise or fall in this measure. When a rise in EPR of greater than 1% was recorded, the industry has been classi...ed as more protected. Falls in EPR of greater than 1% have been categorised as liberalised. The rest have been placed in the middle column indicating modest or no change. In each column, sectors have been ordered by the size of sectoral real GDP, averaged over the 1988-98 period.

The three largest sectors of the South African economy - Finance & insurance, Agriculture and Gold and uranium - have all come under increased protection according to the results of the present study. These three sectors make up almost 40% of the total GDP of the 38 sectors. When the other sectors of the economy in this column are added, the proportion of GDP where protection has increased rises to almost 50%. Thus, while the number of sectors undergoing signi...cant trade liberalisation appears impressive, the picture is di¤erent when one considers the signi...cance of the sectors in terms of their contribution to the output of the economy. The liberalised sectors constitute just over 15% of total GDP from the 38 sectors; while the sectors where there has been little or no change in the EPR constitute the remaining 35% of total GDP.

Thus, the results of an analysis of the e¤ective protection rate derived from actual duties collected by customs reveals a surprising result regarding the pace of liberalisation. Unless the evidence from non tari¤ barriers implies a signig...cant modi...cation of the EPR evidence, the ...ndings of the present study suggest that the much-hyped liberalization of the South African economy in the 1990's has not been fully realized. In terms of sectoral output, protection levels are higher than in the earlier part of the decade; more of

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[6]An alternative would have been a point-to-point comparison between 1988 and 1998. Table 2 o¤ers the reader the means to conduct such a comparison. The ...ndings do not di¤er signi...cantly from those reported in Table 1, except that: a.) Printing, publishing and recorded media and Rubber products come to fall into the more protected category rather than the no change category of sectors, and b.) Electricity, gas & steam, Other chemicals & man-made ...bres, Beverages, Wood & wood products, and Other transport equipment come to move to the liberalised rather than the no change sector. However, care should be taken in the interpretation of these results. EPR's on occasion show strong seasonal variation from year to year. Thus point-to-point changes may be misleading, and averages are a more reliable measure of the state of e¤ective protection in an industry.

SECTOR	ERP88	ERP89	ERP90	ERP91	ERP92	ERP93	ERP94	ERP95	ERP96	ERP97	ERP98
Prof & Scient Prod	0.11	0.10	0.10	0.10	0.09	0.09	0.11	0.06	0.07	0.08	0.10
Leather	0.22	0.20	0.20	0.21	0.20	0.21	0.20	0.17	0.22	0.24	0.26
Tobacco	0.02	0.02	0.06	0.02	0.03	0.06	0.07	0.22	0.07	0.22	0.04
Footwear	0.33	0.26	0.24	0.31	0.33	0.33	0.34	0.21	0.23	0.23	0.21
Other transport equp	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00
Glass & glass prod	1.25	1.14	0.88	0.86	0.86	0.93	0.78	0.54	0.46	0.47	0.57
Building construct	-0.01	0.00	0.00	-0.01	-0.01	-0.01	-0.01	0.00	-0.01	-0.01	-0.01
Rubber products	0.17	0.18	0.18	0.17	0.16	0.16	0.16	0.13	0.16	0.19	0.18
Furniture	0.17	0.07	0.08	0.11	0.08	0.04	0.01	0.03	0.05	0.06	0.04
TV,radio & equip	0.11	0.11	0.12	0.11	0.12	0.12	0.09	0.06	0.03	0.03	0.02
Other industries	0.05	0.04	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.00	0.00
Wood & wood prod	0.03	0.02	0.03	0.02	-0.01	0.02	0.02	0.00	0.01	0.02	0.02
Plastic products	0.17	0.15	0.15	0.34	0.15	0.16	0.16	0.10	0.12	0.10	0.11
Wearing apparel	0.15	0.19	0.15	0.09	0.08	0.03	0.06	0.07	0.07	0.11	0.11
Textiles	0.15	0.14	0.11	0.10	0.07	-0.01	0.03	0.08	0.17	0.17	0.23
Med,Dent,Heal,Vet	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Print,pub & record	0.14	0.10	0.11	0.15	0.14	0.14	0.14	0.10	0.14	0.14	0.15
Electrical Mach	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.04	0.03	0.03
Coke & Ref pet	-0.01	-0.02	-0.01	-0.02	-0.01	-0.01	0.00	-0.01	-0.03	-0.01	-0.01
Non-metallic min	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
Beverages	0.03	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01
Basic non-ferrous	0.06	0.07	0.08	0.07	0.05	0.05	0.07	0.05	0.06	0.02	0.02
Basic chemicals	0.10	0.06	0.06	0.04	0.04	0.05	0.03	0.03	0.03	0.02	0.03
Transport & stor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paper & paper pro	1.24	1.14	1.00	1.15	1.14	1.20	0.87	0.49	0.62	0.54	0.56
Coal Mining	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Oth Chem&man …b	0.05	0.04	0.04	0.05	0.03	0.03	0.03	0.02	0.08	0.03	0.01
Mot Veh,parts	0.08	0.07	0.06	0.07	0.05	0.05	0.03	0.03	0.04	0.04	0.02
Metal prod ex mach	0.01	0.02	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Wholesale & retail	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Food	-0.01	-0.01	0.02	0.04	0.07	0.05	0.08	0.07	0.05	0.06	0.06
Machinery & equip	0.00	-0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
Basic iron & steel	0.21	0.20	0.23	0.22	0.19	0.21	0.21	0.13	0.15	0.17	0.16
Other mining	-0.08	-0.04	-0.04	-0.07	-0.07	-0.07	-0.08	-0.05	-0.06	-0.04	-0.04
Elec,gas & steam	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.05	0.07	0.06	0.06
Gold & Uran	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
Agri, Forest & Fish	0.04	0.04	0.05	0.06	0.06	0.06	0.06	0.05	0.07	0.06	0.08
Finance & Ins	-0.19	-0.18	-0.20	-0.20	-0.20	-0.20	-0.20	-0.15	-0.22	-0.17	-0.18

Table 2: E¤ective Protection Rates by Sector, 1988-98

MORE PROTECTED	MODEST OR NO CHANGE	LIBERALISED
Finance & insurance	Electricity,gas & steam	Basic iron & steel
Agriculture,foresty & ...shing	Machinery & equipment	Motor vehicles,parts & access
Gold & uranium ore mining	Wholesale & retail trade	Paper & paper products
Other mining	Metal products excluding machinery	Basic chemicals
Food	Other chemicals & man-made ...bres	Basic non-ferrous metals
Textiles	Coal mining	Electrical machinery
Tobacco	Transport & storage	Wearing apparel
Leather & leather products	Beverages	Plastic products
	Non-metallic minerals	Other industries
	Coke & re...ned petroleum products	TV,radio & comm equip
	Printing,publishing & recorded media	Furniture
	Medical,dental & other health &	Glass & glass products
	veterinary services	Footwear
	Wood & wood products	Prof & scient equip
	Rubber products	
	Building contruction	
	Other transport equipment	

Table 3: Trade liberalisation by sector

South Africa's output is protected by tari¤s in 1998 than in 1988. This is explained by the fact that the EPR measures the overall e¤ect of the changes in rates of nominal tari¤s adjusting for the protection of inputs into the production process. The sectors that generate a large proportion of the aggregate output of the South African economy have appeared to experience a more signi…cant liberalization of the inputs into production, than on their output. The overall impact of the change in the trade regime in South Africa is likely to be complex. Tari¤ reductions have been paralleled by the phasing out of input import credits. This may explain the overall pattern observed here.

3.1.3   Sectoral changes

One feature that must be noted is that in those sectors where protection has been reduced, the proportional fall in the EPR is typically greater than in sectors where the protection levels have increased. For example, the three largest sectors in the more protected industries have seen EPR rises of approximately 1%; with liberalising sectors, the EPR has fallen by 5%, 3% and 53% in the three largest sectors (Basic iron & steel; Motor vehicles, parts & accessories; Paper & paper products). Thus, where protection has been cut, the changes have been pronounced. The two largest changes have been in the Paper & paper products sector (53% fall in EPR) and Glass & glass products sector (42% fall).

   Lastly, two sectors manifest interesting dynamics in their EPR's: Wearing apparel and Textiles both have U-shaped lines over 1988-98 with textiles in fact being more protected at the end of the period than the start.

4   Trade Patterns and Protection Rates

We have seen that trade liberalization of the South African economy in the 1990's has been less pronounced than is often supposed. Nevertheless in the remainder of this paper we undertake a preliminary analysis of whether the changes in protection (such as they are) have had any impact on trade patterns in South Africa's economic sectors.

4.1   Import Penetration

The analysis of import penetration has been disaggregated across three periods to indicate the impact of the changes in trade protection over the 1980s. Thus we examine import penetration in the 1970's, the 1980's and the 1990's. Absolute levels of import penetration - value of imports divided by value of sales - is indicated in Figure 1. Growth rates in import penetration are indicated in Figure 2.[7]

The tables indicates some general trends in import penetration into the economy:

- Overall import penetration was 14% in 1970, 15% in 1980, 11% in 1990 rising to 17% in 1998;

- There is no import penetration in the utilities and low penetration into the minerals of which South Africa is a major producer

- Import penetration has been high and rising in technology sectors: Machinery & equipment, Other transport equipment, Television, radio & communication equipment and Professional & scienti...c equipment

It is worth noting the very di¤erent trade patterns reported across economic sectors - reported in Figure 1. The sectors with low import penetration are entirely plausible - with South Africa's dominant position in terms of natural resource extraction, and with the prevalence of service sectors and utilities in particular. Indeed all service sectors have import penetration levels of less than 10%. Relatively high import penetration levels are most prevalent in the manufacturing industries.

The evidence of Figure 1 indicates that in some sectors there has been very strong growth in import penetration during the course of the 1990's. However, while a eight of these sectors did indeed experience increased trade

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[7]Note that the import penetration measure is of the imports of the output produced by a particular sector, relative to the total domestic sales of that class of output. Thus the measure is of foreign competition in the market for a particular good or service, and it does not measure the magnitude of imports used as inputs in the production of the output in question. Thus, while Gold & Uranium mining, and Electricity, Gas & Water might both be strong importers of capital equipment, they would report low import penetration ratios since South Africa does not import either gold and uranium or electricity, gas & water to any great extent.

liberalization over this period (in terms of the classi...cation of Table 1),[8] seven experienced no signi...cant change in protection,[9] and two experienced increased protection over the course of the 1990's.[10] The implication is that it is di¢cult to ascribe the pattern of increased import penetration that emerges during the course of the 1990's unambiguously to the process of trade liberalization. Import penetration also increased in sectors that did not experience a lowering of e¤ective protection. Indeed, for some sectors such as Textiles that experienced moderate to strong growth in import penetration while at the same time having experiencing increasing e¤ective protection rates, the implication is at least potentailly one of signi...cant levels of ine¢ciency within the domestic industry as the most plausible explanation of increased import penetration. In any event, since import penetration inceased in virtually all sectors of the economy, it may be more informative to consider not the absolute change in import penetration in each economic sector of the economy, but to consider the relative change in import penetration instead.

The change in the rank of a sector is one means by which we can consider changes in the relative international competitiveness of South Africa's economic sectors. A high negative change in rank implies the import penetration in a sector has fallen, suggesting foreign entry into the market has declined relative to other sectors in the economy. To highlight the sectors where the ordering of import penetration has changed signi...cantly, the sectors where absolute rank change exceeds ...ve will be the main focus of the subsequent discussion. Since growth rates of import penetration display much more variance across sectors, absolute rank changes greater than 20 will be considered as signi...cant.

A general ...nding is that the import penetration falls in sectors where trade protection has increased. According to Table 1, Finance & insurance, Tobacco and Other mining have become more protected over the 1988-98 period. This may explain the signi...cant fall in import penetration in relative terms: Other mining's rank has fallen by 6, Finance and insurance by 10 while Tobacco has seen a rank drop of 5. Thus while import penetration has not decreased in these sectors, the degree of import penetration in these sectors has fallen relative to that experienced by other sectors, as might be expected

[8]In particular: Furniture, Plastic Products, Wearing Apparel, Glass, Footwear, Other Industries, TV & etc., Professional & Scienti...c Equipment.

[9]Coal Mining, Non-mettalic minerals, Rubber, CVoke, Printing, Machinery, Other transport.

[10]Agriculture, Forestry & Fishing, Food.

Description	1970	1980	1990	1998	Rank 1970	Rank 1980	Rank 1990	Rank 1998	Change 1970-98
Gold & uranium ore mining	0.00	0.00	0.00	0.00	1	1	1	1	0
Water supply	0.00	0.00	0.00	0.00	2	2	2	2	0
Other community, social & personal services: Non-profit seeking	0.00	0.00	0.00	0.00	3	3	3	3	0
Electricity, gas & steam	0.00	0.00	0.00	0.00	4	8	4	4	0
Wholesale & retail trade	0.00	0.00	0.00	0.00	5	4	5	5	0
Building construction	0.00	0.00	0.00	0.00	6	5	6	6	0
Civil engineering & other construction	0.02	0.00	0.00	0.01	9	6	7	7	-2
Medical, dental & other health & veterinary services	0.08	0.06	0.02	0.01	19	17	9	8	-11
Business services	0.02	0.03	0.02	0.02	10	12	10	9	-1
Coal mining	0.00	0.00	0.01	0.03	7	7	8	10	3
Tobacco	0.07	0.02	0.03	0.03	16	9	11	11	-5
Finance & insurance	0.09	0.11	0.04	0.03	22	26	14	12	-10
Other community, social & personal services: Profit seeking	0.12	0.09	0.05	0.05	24	22	18	13	-11
Beverages	0.03	0.04	0.04	0.05	11	13	15	14	3
Communication	0.00	0.18	0.06	0.07	8	32	23	15	7
Agriculture, forestry & fishing	0.05	0.03	0.03	0.07	15	10	13	16	1
Other	0.05	0.09	0.06	0.08	13	21	22	17	4
Basic iron & steel	0.11	0.06	0.06	0.09	23	15	20	18	-5
Furniture	0.04	0.03	0.03	0.09	12	11	12	19	7
Food	0.07	0.04	0.05	0.10	18	14	17	20	2
Transport & storage	0.13	0.07	0.10	0.11	26	19	26	21	-5
Plastic products	0.07	0.06	0.06	0.11	17	16	21	22	5
Basic non-ferrous metals	0.22	0.08	0.09	0.12	28	20	24	23	-5
Paper & paper products	0.25	0.18	0.11	0.14	32	31	28	24	-8
Wearing apparel	0.22	0.09	0.06	0.14	29	23	19	25	-4
Wood & wood products	0.23	0.12	0.10	0.15	30	27	27	26	-4
Catering & accommodation services	0.05	0.19	0.13	0.16	14	33	31	27	13
Non-metallic minerals	0.08	0.07	0.09	0.17	20	18	25	28	8
Metal products excluding machinery	0.13	0.11	0.11	0.19	25	25	29	29	4
Other chemicals & man-made fibers	0.30	0.13	0.19	0.33	35	28	34	30	-5
Glass & glass products	0.26	0.24	0.15	0.33	33	36	32	31	-2
Textiles	0.27	0.17	0.22	0.34	34	30	36	32	-2
Leather & leather products	0.31	0.21	0.20	0.35	36	34	35	33	-3
Rubber products	0.15	0.13	0.19	0.40	27	29	33	34	7
Footwear	0.09	0.11	0.04	0.41	21	24	16	35	14
Other mining	0.61	1.14	0.50	0.42	42	45	43	36	-6
Coke & refined petroleum products	0.39	0.27	0.12	0.48	38	37	30	37	-1
Electrical machinery	0.34	0.28	0.31	0.49	37	38	38	38	1
Motor vehicles, parts & accessories	0.74	0.54	0.37	0.50	43	41	39	39	-4
Printing, publishing & recorded media	0.24	0.23	0.25	0.51	31	35	37	40	9
Basic chemicals	0.46	0.42	0.42	0.72	39	39	40	41	2
Other industries	1.57	1.01	0.53	1.02	45	44	44	42	-3
Machinery & equipment	0.81	0.66	0.56	1.57	44	42	45	43	-1
Other transport equipment	0.58	0.70	0.44	2.22	41	43	41	44	3
Television, radio & communication equipment	0.53	0.53	0.47	3.54	40	40	42	45	5
Professional & scientific equipment	2.49	3.34	2.63	4.92	46	46	46	46	0

Figure 1: Absolute Import Penetration

Description	1970s	1980s	1990s	Rank 1970s	Rank 1980s	Rank 1990s	Change 1970-97
Gold & uranium ore mining	0.00	0.00	0.00	1	1	1	0
Water supply	0.00	0.00	0.00	2	2	2	0
Other community, social & personal services: Non-profit seeking	0.00	0.00	0.00	3	3	3	0
Medical, dental & other health & veterinary services	1.01	0.03	0.93	27	12	4	-23
Other community, social & personal services: Profit seeking	1.01	0.07	0.98	29	17	5	-24
Other mining	1.11	0.78	0.99	41	43	6	-35
Finance & insurance	1.08	0.07	0.99	39	18	7	-32
Business services	1.05	0.03	1.00	35	9	8	-27
Wholesale & retail trade	1.09	0.00	1.00	40	4	9	-31
Communication	1.71	0.11	1.00	45	26	10	-35
Transport & storage	0.94	0.07	1.01	10	21	11	1
Catering & accommodation services	1.19	0.16	1.01	42	32	12	-30
Motor vehicles, parts & accessories	0.96	0.48	1.02	14	40	13	-1
Basic iron & steel	1.05	0.05	1.02	36	14	14	-22
Tobacco	0.89	0.03	1.02	7	11	15	8
Beverages	1.02	0.04	1.03	31	13	16	-15
Other	1.06	0.07	1.04	37	20	17	-20
Wood & wood products	0.95	0.11	1.04	12	25	18	6
Basic chemicals	1.01	0.47	1.04	28	39	19	-9
Paper & paper products	0.97	0.13	1.05	19	28	20	1
Electrical machinery	0.96	0.32	1.05	16	38	21	5
Metal products excluding machinery	0.97	0.12	1.05	21	27	22	1
Other industries	0.94	1.20	1.05	11	45	23	12
Other chemicals & man-made fibers	0.93	0.15	1.06	9	30	24	15
Plastic products	0.99	0.07	1.07	23	19	25	2
Rubber products	1.01	0.17	1.07	26	33	26	0
Basic non-ferrous metals	0.89	0.07	1.08	6	22	27	21
Leather & leather products	0.95	0.22	1.08	13	36	28	15
Food	0.97	0.06	1.08	20	16	29	9
Professional & scientific equipment	1.04	2.58	1.08	34	46	30	-4
Textiles	0.97	0.19	1.08	17	34	31	14
Electricity, gas & steam	0.00	0.00	1.08	4	5	32	28
Glass & glass products	0.99	0.22	1.09	24	35	33	9
Non-metallic minerals	1.00	0.08	1.09	25	23	34	9
Wearing apparel	0.90	0.09	1.09	8	24	35	27
Machinery & equipment	0.96	0.73	1.09	15	42	36	21
Printing, publishing & recorded media	1.02	0.27	1.09	32	37	37	5
Building construction	1.29	0.00	1.10	44	6	38	-6
Civil engineering & other construction	0.79	0.00	1.11	5	8	39	34
Furniture	0.97	0.03	1.14	18	10	40	22
Agriculture, forestry & fishing	0.97	0.05	1.20	22	15	41	19
Television, radio & communication equipment	1.04	0.62	1.24	33	41	42	9
Other transport equipment	1.29	0.84	1.25	43	44	43	0
Coke & refined petroleum products	1.06	0.16	1.29	38	31	44	6
Footwear	1.01	0.13	1.33	30	29	45	15
Coal mining	9.01	0.00	1.46	46	7	46	0

Figure 2: Growth in Import Penetration

under conditions of rising trade protection.

The converse case is that we would anticipate that sectors that have been liberalised, would experience increased import penetration, and thus that the degree of import penetration relative to other economic sectors would increase. However we ...nd that this is true only in a limited number of sectors. Of the sectors that have been liberalised, increases in relative import penetration have been observed in Plastic products (5), Television, radio and communication equipment (5), Furniture (7) and Footwear (14). While this outcome is as expected, we also ...nd three sectors which have undergone liberalisation that have seen decreasing relative import penetration: Basic iron & steel (5), Basic non-ferrous products (5) and Paper and paper products (8). The latter, as noted above, has undergone a drastic fall in its e¤ective protection rate making this result surprising. The degree of import penetration has fallen relative to other sectors despite the fall in e¤ective protection.

But perhaps more revealing in the current context is evidence that emerges from the growth in import penetration over the 1970-97 period. First, we note that the average (across all sectors) rate of growth of import penetration was not the highest during the 1990's. The average growth rate of import penetration across all economic sectors during the 1970's was 1.11%, which fell to 0.24% during the period of relative international isolation of the 1980's, and rose again to 1.01% during the 1990's. Thus the period most strongly associated with trade liberalization, the 1990's, is not most strongly associated with import penetration in the South African economy. Indeed, since import penetration of the economy has always shown positive growth rates over the full sample period, and since the 1980's have shown relatively slow growth in import penetration, one might argue that the resurgence in growth of import penetration during the 1990's may at least in part be due to a "catch-up" e¤ect as foreign producers made up for the lost time of the 1980's. At the very least, it is di¢cult to argue that the period of trade liberalization is unambiguously responsible for the pace of import penetration of the South African economy.

However, and this is the second point to emerge from the import penetration growth rates, there is a clear distinction that emerges between sectors that have liberalised, and those that have become more protected during the course of the 1990's. In particular, we ...nd that the average growth rate in import penetration during the 1990's in sectors that have become more protected in terms of our classi...cation, have reported an average growth in import penetration of 0.93%. By contrast, for liberalised sectors the average

growth rate has been 1.10%. Two implications emerge from this evidence. On the one hand, trade liberalisation does appear to have been associated with a higher rate of growth in import penetration. But on the other hand, what also emerges is that increased e¤ective protection rates do not serve to prevent growth in import penetration. Even for those sectors that have increased their e¤ective protection rates, growth in import penetration has been positive, and only slightly less than 1% on average.

The results regarding growth rates in import penetration indicate a good deal of volatility in the ranks of the various sectors. Initially we can look at sectors which have become more protected according to their e¤ective rates of protection. Signi...cant falls in the rank of the growth rate are observed in the same sectors as indicated by the analysis of absolute import penetration: Finance & insurance (falls 32), Other mining (falls 35). No sectors which experienced increased protection have moved up the import penetration growth table by more than 20 ranks suggesting that the increased protection has affected import penetration in the expected negative way.

With the liberalised sectors the picture is again more complex. Some sectors have shown signi...cant relative increases in thie growth in import penetration: Basic non-ferrous metals (increased rank of 21), Wearing apparel (increased rank of 27) and furniture (increased rank of 22). However. large sectors (in volume of output terms) have seen growth in import penetration fall despite the liberalisation making foreign goods more attractive to domestic consumers in these sectors: Basic iron & steel (decreased rank of 22) and Other industries (decreased rank of 20).

The implications of these ...ndings are thus that increased trade protection appears to have served to decrease competitive forces in the relevant sectors by lowering the rate of foreign entry. By contrast, trade liberalization has served to increase foreign competitive pressures in only some of the economic sectors that have experienced reductions in tari¤s. For others, trade liberalisation has been accompanied by decreased import penetration.[11]

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[11]Given the scope of the present paper it is di¢cult to explain why some sectors have experienced decreased foreign competition (in relative terms) in the face of trade liberalization. Given the limited number of sectors involved, this might be the topic of an additional, more clinical study. One possibility worth exploring is whether these sectors have come to realise preemptive productivity and e¢ciency improvements, in order to discourage foreign entry into the domestic market. Another is that they were already relatively liberalized.

4.2 Export Orientation of South African Economic Sectors

In Figure 3 we report the relative export orientation of South African economic sectors. We de...ne export orientation by the ratio of total exports to total output for each economic sector. Note that the export orientation of South Africa's economic sectors is far less pronounced than is the degree of import penetration of South Africa's markets - see for instance the categorization of sectors in terms of the extent of their export orientation in Figure 3. What is noticeable from the evidence of Figure 6, however, is the very strong increase in the export performance of a number of sectors during he course of the 1990's. Moreover, what emerges is that for six sectors[12] improved export performance was realized despite increased trade liberalization, while only two sectors with increased trade protection showed improved export orientation,[13] and only three sectors with unchanged[14] trade protection improved their export orientation substantially. Thus of the sectors with strong improvements in export orientation the majority faced substantial effective trade liberalization - suggesting that the liberalization may well have forced e¢ciency gains on the sectors as a precursor to improved performance on international markets. By contrast there is little evidence suggesting that increased protection helped sectors to penetrate international markets.

We also consider the change in relative export orientation between economic sectors. Relative export orientation is then captured by the rank of the economic sector relative to other economic sectors in terms of its export orientation.

The evidence of Figure 3 shows that South African economic sectors range from complete inward orientation, to complete outward orientation. Thus for a number of sectors, the proportion of output that is exported is either zero, or very close to zero - see for instance Water Supply and Building Construction. On the other extreme, Gold mining essentially exports its entire output, pointing to a complete outward orientation of the industry.

We also note that over time considerable change in the relative export orientation of South African economic sectors has occurred. Moreover, the strongest change has occurred during the course of the 1990's. This can

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[12] Motor Vehicles & Accessories, ELectrical machinery, TV & etc., Furniture, Basic Chemicals, Prof. & Scienti...c Equipment.
[13] Textiles, Leather.
[14] Rubber, Metal Products, Machinery & Equipment.

	1970	1980	1990	1997	Rank 1970	Rank 1980	Rank 1990	Rank 1997	ChgRank 1970-97
Water supply	0.00	0.00	0.00	0.00	1	1	1	1	0
Building construction	0.00	0.00	0.00	0.00	2	2	2	2	0
Other	0.00	0.00	0.00	0.00	7	3	3	3	-4
Civil engineering & other construction	0.01	0.00	0.00	0.00	9	5	4	4	-5
Electricity, gas & steam	0.00	0.00	0.00	0.01	5	6	6	5	0
Other community, social & pers. services (nonProfit)	0.00	0.00	0.01	0.01	4	4	7	6	2
Medical, dental & other health & veterinary services	0.00	0.01	0.01	0.01	3	13	9	7	4
Printing, publishing & recorded media	0.01	0.01	0.01	0.02	12	8	8	8	-4
Business services	0.01	0.01	0.02	0.02	13	10	11	9	-4
Other community, social & personal services (profit)	0.01	0.02	0.03	0.03	16	19	13	10	-6
Footwear	0.01	0.02	0.00	0.04	10	18	5	11	1
Wholesale & retail trade	0.05	0.04	0.04	0.05	28	27	19	12	-16
Plastic products	0.03	0.01	0.02	0.06	23	7	10	13	-10
Communication	0.00	0.06	0.06	0.06	6	29	24	14	8
Wood & wood products	0.01	0.04	0.07	0.07	15	25	25	15	0
Non-metallic minerals	0.11	0.04	0.03	0.07	35	26	14	16	-19
Other chemicals & man-made fibers	0.11	0.02	0.04	0.08	34	16	17	17	-17
Beverages	0.02	0.01	0.02	0.09	17	11	12	18	1
Tobacco	0.01	0.01	0.03	0.09	14	9	15	19	5
Food	0.17	0.10	0.08	0.09	39	34	28	20	-19
Wearing apparel	0.01	0.03	0.05	0.10	11	20	21	21	10
Finance & insurance	0.11	0.12	0.08	0.10	32	35	27	22	-10
Glass & glass products	0.05	0.07	0.09	0.12	27	30	30	23	-4
Motor vehicles, parts & accessories	0.05	0.03	0.05	0.12	26	22	23	24	-2
Electrical machinery	0.04	0.02	0.05	0.13	25	14	22	25	0
Rubber products	0.02	0.02	0.04	0.16	18	15	18	26	8
Transport & storage	0.19	0.18	0.16	0.16	40	39	37	27	-13
Agriculture, forestry & fishing	0.16	0.14	0.12	0.16	36	37	33	28	-8
Catering & accommodation services	0.16	0.13	0.15	0.17	37	36	35	29	-8
Textiles	0.04	0.05	0.14	0.19	24	28	34	30	6
Metal products excluding machinery	0.03	0.02	0.08	0.19	22	17	29	31	9
Paper & paper products	0.11	0.08	0.18	0.20	33	31	39	32	-1
Coke & refined petroleum products	0.42	0.23	0.15	0.22	43	41	36	33	-10
Television, radio & communication equipment	0.03	0.01	0.04	0.23	20	12	16	34	14
Machinery & equipment	0.09	0.03	0.07	0.33	30	24	26	35	5
Furniture	0.00	0.03	0.04	0.37	8	23	20	36	28
Leather & leather products	0.03	0.08	0.09	0.42	19	32	31	37	18
Coal mining	0.08	0.49	0.45	0.43	29	44	43	38	9
Other industries	0.61	0.27	0.24	0.48	44	42	40	39	-5
Basic chemicals	0.10	0.10	0.18	0.51	31	33	38	40	9
Basic iron & steel	0.17	0.18	0.44	0.53	38	38	42	41	3
Other transport equipment	0.03	0.03	0.12	0.53	21	21	32	42	21
Basic non-ferrous metals	0.20	0.38	0.61	0.56	41	43	44	43	2
Professional & scientific equipment	0.31	0.21	0.33	0.64	42	40	41	44	2
Other mining	0.69	1.24	0.89	0.99	45	46	45	45	0
Gold & uranium ore mining	1.07	1.00	1.05	1.02	46	45	46	46	0
Total	0.12	0.20	0.15	0.17					

Figure 3: Exports as Proportion of Total Sales; high rank indicates high proportion

be noted in a number of ways. In 1970, only ...ve sectors[15] had an export orientation of 20% or more of output. While this increased to seven sectors in 1980,[16] and in 1990,[17] by 1997 the number of sectors exporting more than 20% of output had increased to fourteen.[18] Figures 4 through 7 illustrate the export ratios of economic sectors, and the emerging increase in export orientation during the course of the 1990's - note particularly the change from Figure 6 to 7, and the growth in mid-level export orientation. Again, therefore, the trade liberalization of the 1990's are di¢cult to identify with a period of worsened export performance of the South African economy.

Moreover, for a number of the sectors with an emerging export orientation during the course of the 1990's, the increase in the proportion of output exported is signi...cant. Thus we note:

² That for Television, Radio & Communications Equipment, exports increased from 4% of output in 1990, to 23% of output in 1997.

² For Machinery & Equipment, exports increased from 7% of output in 1990, to 33% of output in 1997.

² For Furniture, exports increased from 4% of output in 1990, to 37% of output in 1997.

² For Leather & Leather Products, exports increased from 9% of output in 1990, to 42% of output in 1997.

² For Other Industries, exports increased from 24% of output in 1990, to 48% of output in 1997.

² For Basic Chemicals, exports increased from 18% of output in 1990, to 51% of output in 1997.

[15]Gold & Uranium Mining, Other Mining, Professional & Scienti...c Equipment, Other Industries, Coke & Re...ned Petroleum Products.

[16]Gold & Uranium Mining, Other Mining, Professional & Scienti...c Equipment, Basic Non-ferrous Metals, Other Industries, Coal Mining, Coke & Re...ned Petroleum Products.

[17]Gold & Uranium Mining, Other Mining, Professional & Scienti...c Equipment, Basic Non-ferrous Metals, Basic Iron & Steel, Other Industries, Coal Mining.

[18]Gold & Uranium Mining, Other Mining, Professional & Scienti...c Equipment, Basic Non-ferrous Metals, Other Transport Equipment, Basic Iron & Steel, Basic Chemicals, Other Industries, Coal Mining, Leather & Leather Products, Furniture, Machinery & Equipment, Television, radio & Communications Equipment, Coke & Re...ned Petroleum Products.

Figure 4: Export Orientation: Absolute Ratio 1970

Export Orientation: Absolute Ratio 1970

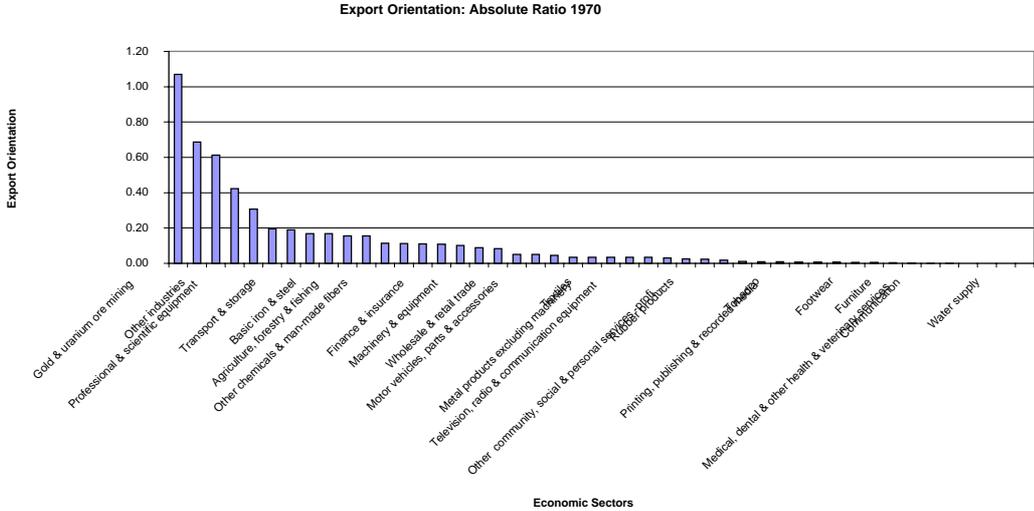Economic Sectors

Figure 5: Export Orientation: Absolute Ratio 1980

Export Orientation: Absolute Ratio 1980
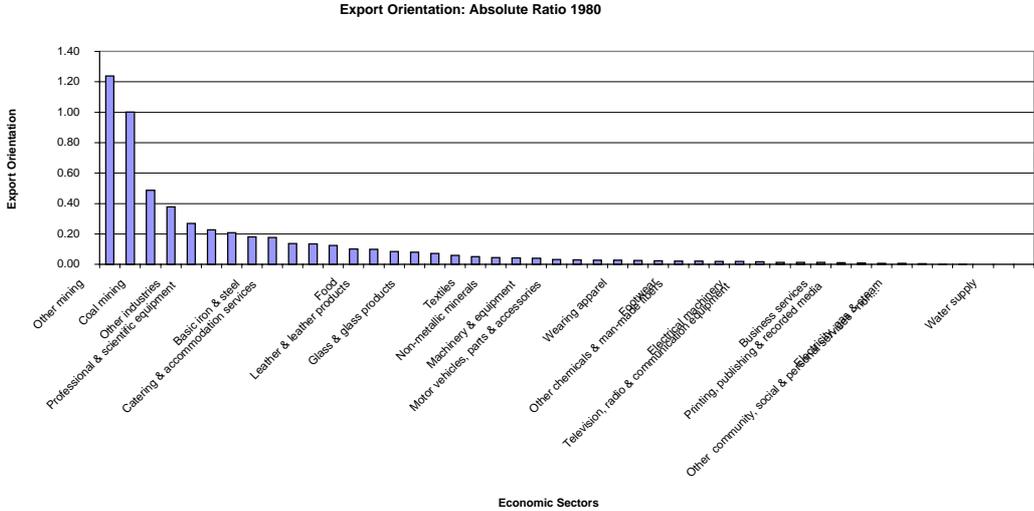
Figure 6: Export Orientation: Absolute Ratio 1990
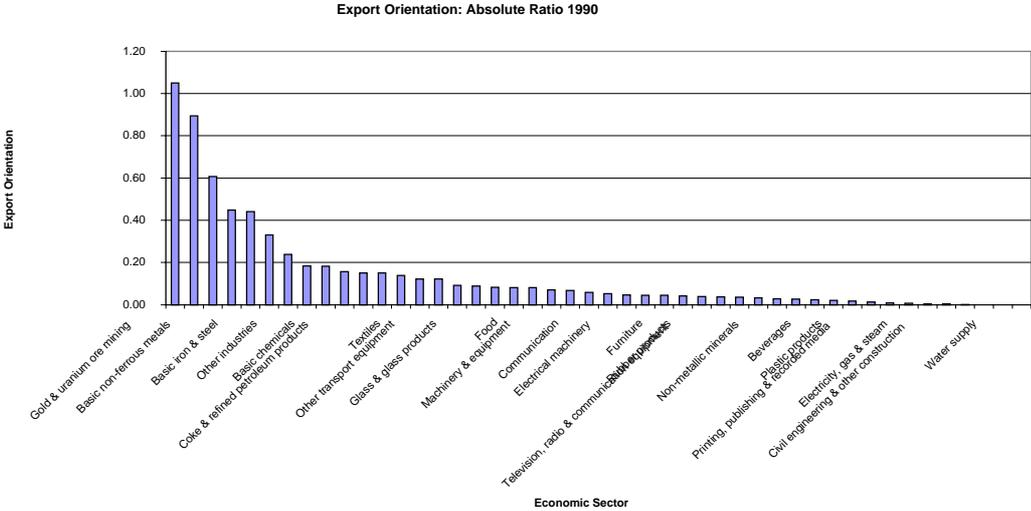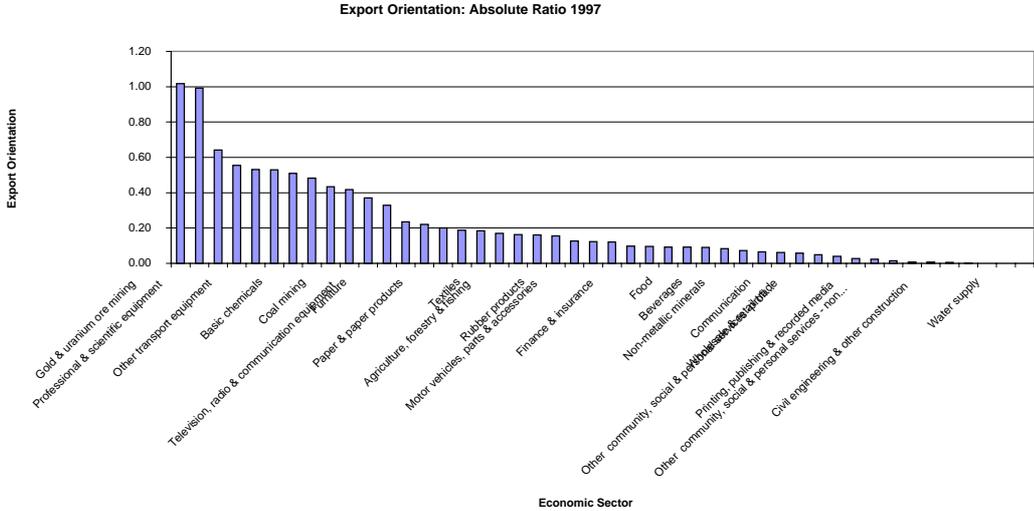
Export Orientation: Absolute Ratio 1990

Figure 7: Export Orientation: Absolute Ratio 1997

² For Other Transport Equipment, exports increased from 12% of output in 1990, to 53% of output in 1997.

² For Professional & Scienti...c Equipment, exports increased from 33% of output in 1990, to 64% of output in 1997.

The suggestion that the 1990's saw a change in the orientation of trade policy, and that such a change had a signi...cant impact on the trade performance of economic sectors, is thus a plausible one in the face of such evidence.

Indeed, the evidence in favour of a restructuring of South African production in the face of a revised trade regime gains further strength from a consideration of the average growth rates in export orientation over the three decades that have informed this study. Growth rates are reported in Figure 8. For a number of sectors that do not rank highly in terms of their absolute export orientation, improvements in export orientation during the course of the 1990's has nevertheless been substantial. Thus Other Chemicals & Man-Made Fibres (17.33%), Plastic Products (16.46%), Electrical Machinery (18.03%), Beverages (25.67%), Rubber Products (20.17%), Printing, Publishing & Recorded Media (27.43%), Motor Vehicles, Parts & Accessories (19.81%), Footwear (38.88%), and Tobacco (16.82%) have all shown signi...cant average growth in export orientation during the course of the 1990's, despite exporting relatively small proportions of total output at present. Given that the change in trade regime will take time to have its full impact, particularly if both direct and indirect e¤ects are considered, it may well be that these sectors will be able to establish a much stronger export presence over time - as long as their current growth rates in export orientation can be maintained.

It is notable that of the fourteen sectors which were classi...ed as "Liberalised" in terms of our earlier discussion of EPR's, only one sector showed declining export orientation,[19] four showed moderate increases in export orientation (with average growth rates in export orientation during the 1990's between 0% and 10%),[20] and nine sectors showed strong to very strong increases in export orientation (with growth rates in export orientation above

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[19] Basic Non-ferrous metals, with an average growth rate of -1.4% in export orientation during the course of the 1990's.

[20] Basic Iron & Steel, Paper & Paper Products, Other Industries, Glass & Glass Products.

	1970	1980	1990	1997	Rank 1970	Rank 1980	Rank 1990	Rank 1997	ChgRank 1970-97
Water supply	0.00	0.00	0.00	0.00	1	1	1	1	0
Building construction	0.00	0.00	0.00	0.00	2	2	2	2	0
Other	0.00	0.00	0.00	0.00	7	3	3	3	-4
Civil engineering & other construction	0.01	0.00	0.00	0.00	9	5	4	4	-5
Electricity, gas & steam	0.00	0.00	0.00	0.01	5	6	6	5	0
Other community, social & pers. services (nonProfit)	0.00	0.00	0.01	0.01	4	4	7	6	2
Medical, dental & other health & veterinary services	0.00	0.01	0.01	0.01	3	13	9	7	4
Printing, publishing & recorded media	0.01	0.01	0.01	0.02	12	8	8	8	-4
Business services	0.01	0.01	0.02	0.02	13	10	11	9	-4
Other community, social & personal services (profit)	0.01	0.02	0.03	0.03	16	19	13	10	-6
Footwear	0.01	0.02	0.00	0.04	10	18	5	11	1
Wholesale & retail trade	0.05	0.04	0.04	0.05	28	27	19	12	-16
Plastic products	0.03	0.01	0.02	0.06	23	7	10	13	-10
Communication	0.00	0.06	0.06	0.06	6	29	24	14	8
Wood & wood products	0.01	0.04	0.07	0.07	15	25	25	15	0
Non-metallic minerals	0.11	0.04	0.03	0.07	35	26	14	16	-19
Other chemicals & man-made fibers	0.11	0.02	0.04	0.08	34	16	17	17	-17
Beverages	0.02	0.01	0.02	0.09	17	11	12	18	1
Tobacco	0.01	0.01	0.03	0.09	14	9	15	19	5
Food	0.17	0.10	0.08	0.09	39	34	28	20	-19
Wearing apparel	0.01	0.03	0.05	0.10	11	20	21	21	10
Finance & insurance	0.11	0.12	0.08	0.10	32	35	27	22	-10
Glass & glass products	0.05	0.07	0.09	0.12	27	30	30	23	-4
Motor vehicles, parts & accessories	0.05	0.03	0.05	0.12	26	22	23	24	-2
Electrical machinery	0.04	0.02	0.05	0.13	25	14	22	25	0
Rubber products	0.02	0.02	0.04	0.16	18	15	18	26	8
Transport & storage	0.19	0.18	0.16	0.16	40	39	37	27	-13
Agriculture, forestry & fishing	0.16	0.14	0.12	0.16	36	37	33	28	-8
Catering & accommodation services	0.16	0.13	0.15	0.17	37	36	35	29	-8
Textiles	0.04	0.05	0.14	0.19	24	28	34	30	6
Metal products excluding machinery	0.03	0.02	0.08	0.19	22	17	29	31	9
Paper & paper products	0.11	0.08	0.18	0.20	33	31	39	32	-1
Coke & refined petroleum products	0.42	0.23	0.15	0.22	43	41	36	33	-10
Television, radio & communication equipment	0.03	0.01	0.04	0.23	20	12	16	34	14
Machinery & equipment	0.09	0.03	0.07	0.33	30	24	26	35	5
Furniture	0.00	0.03	0.04	0.37	8	23	20	36	28
Leather & leather products	0.03	0.08	0.09	0.42	19	32	31	37	18
Coal mining	0.08	0.49	0.45	0.43	29	44	43	38	9
Other industries	0.61	0.27	0.24	0.48	44	42	40	39	-5
Basic chemicals	0.10	0.10	0.18	0.51	31	33	38	40	9
Basic iron & steel	0.17	0.18	0.44	0.53	38	38	42	41	3
Other transport equipment	0.03	0.03	0.12	0.53	21	21	32	42	21
Basic non-ferrous metals	0.20	0.38	0.61	0.56	41	43	44	43	2
Professional & scientific equipment	0.31	0.21	0.33	0.64	42	40	41	44	2
Other mining	0.69	1.24	0.89	0.99	45	46	45	45	0
Gold & uranium ore mining	1.07	1.00	1.05	1.02	46	45	46	46	0
Total	0.12	0.20	0.15	0.17					

Figure 8: Average Growth Rates in Exports/Real Sales (High Rank denotes high growth rate)

10% on average through the 1990's).[21] By contrast, of the sectors with strong growth in export performance, only two experienced increased protection in terms of EPR's,[22] and ...ve had a modest or negligible change in protection.[23]

It is therefore plausible to suggest that trade liberalization in South Africa had the e¤ect of an improved export performance of at least some economic sectors. Moreover, it is di₵cult to argue that the impact of trade liberalization was negative on a substantial part of the economy. Only Gold & Uranium Ore Mining (-0.5%), Other Community, Social & Personal Services (-0.05%), and Basic Non-Ferrous Metals (-1.4%) experienced negative growth rates in export orientation during the course of the 1990's. Of these Gold & Uranium Ore Mining became increasingly protected during the 1990's as measured by EPR's, and only Basic Non-Ferrous Metals was classed as falling into the liberalized category on our classi...cation. Even those sectors that experienced substantial falling relative export orientation (i.e. relative to other sectors, as measured by the sector rank), for the most part were increasing their absolute export orientation.[24]

As a ...nal observation on the evidence note that the increased export orientation has appeared primarily amongst manufacturing sectors.

The net implication is thus that trade liberalization appears to have been associated with an improving export orientation of the South African economy. While the present study is not in a position to examine the question of the direction of association, one possible interpretation is that the increased openness of sectors has led to improved competitiveness of the associated economic sectors, with concomitant improvements in export performance. The depreciating domestic currency may also have conributed to the improved competitiveness of South African exports.

[21]Motor Vehicles, Parts & Accessories (19.81%), Basic Chemicals (10.82%), Electrical Machinery (18.03%), Wearing Apparel (14.27%), Plastic Products (16.46%), Television, Radio & Communications Equipment (26.31%), Furniture (37.97%), Footwear (37.88%), Professional & Scienti...c Equipment (14.45%).

[22]Tobacco, Leather & Leather Products.

[23]Machinery & Equipment, Other Chemicals & Man-Made Fibres, Printing, Publishing & Recorded Media, Rubber Products, Other Transport Equipment.

[24]The following sectors experienced a fall in their rank of 10 or more over the full 1970-97 period: Wholesale & Retail Trade (-16), Non-metallic Minerals (-19), Food (-19), Finance & Insurance (-10), Transport & Storage (-13), Coke & Re...ned Petroleum Products (-10).

4.3   Openness of South African Economic Sectors

Our ...nal concern is with the openness of South Africa's economic sectors as measured by the ratio of imports and exports to total output. Two consider-ations suggest this examination. First, the openness measure provides some insight into the net exposure of each sector to developments in international markets - regardless of whether they be on the import or export side. Sec-ond, in our discussion of the EPR measures for each of the economic sectors, we immediately noted a series of caveats concerning the reliability of EPR's as measures of the degree of protection a sector faces. As a consequence, the measure computed by the openness ratio is often employed as a proxy for the degree of protection that governs either an economy as a whole, or a given sector. Justi...cation for its use lies in the presumption that low levels of import penetration provides evidence for high protection, while low export orientation may well be the result of domestic producers exploiting rents in domestic markets that are the result of protection, such that they face low incentives to enter competitive international markets. We have encountred both considerations in sections 3 and 4 of this paper already.

In Figure 9 we report the relative openness of South Africa's economic sectors, as measured by the rank of each sector relative to other sectors. Once again, what emerges from the evidence is that South Africa's economic sectors span a wide range in terms of the degree of their openness. Moreover, the di¤erential between the most and least open sectors has been growing over time. Thus in 1970 the maximum openness ratio in 1970 was 2.80, the minimum 0. In 1997 this had changed to 4.39 and 0 respectively. Some sectors in the South African economy (Water Supply) have thus traditionally not been exposed to international markets at all.[25]   Others (Professional & Scienti...c Equipment, for instance) have faced very high, and growing exposure to international markets.

It is important to note however that some of the strong sectoral changes in the openness ratio, are hidden by evidence from the South African economy in aggregate. While a number of sectors have experienced strong increases in their openness, the South African economy as a whole shows less unam-biguous evidence. Thus while the openness ratio increases from 0.27 in 1970, to 0.33 in 1997, the latter magnitude is no greater than the level of 0.35

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[25]Though it is likely that even Water Supply may come to be increasingly exposed to international markets through projects such as the Lesotho Highlands Water Project.

	1970	1980	1990	1997	Rank 1970	Rank 1980	Rank 1990	Rank 1997	ChgRank 1970-97
Water supply	0.00	0.00	0.00	0.00	1	1	1	1	0
Building construction	0.00	0.00	0.00	0.00	2	2	2	2	0
Other	0.00	0.00	0.00	0.00	7	3	3	3	-4
Civil engineering & other construction	0.01	0.00	0.00	0.00	9	5	4	4	-5
Electricity, gas & steam	0.00	0.00	0.00	0.01	5	6	6	5	0
Other community, social & pers. services (nonProfit)	0.00	0.00	0.01	0.01	4	4	7	6	2
Medical, dental & other health & veterinary services	0.00	0.01	0.01	0.01	3	13	9	7	4
Printing, publishing & recorded media	0.01	0.01	0.01	0.02	12	8	8	8	-4
Business services	0.01	0.01	0.02	0.02	13	10	11	9	-4
Other community, social & personal services (profit)	0.01	0.02	0.03	0.03	16	19	13	10	-6
Footwear	0.01	0.02	0.00	0.04	10	18	5	11	1
Wholesale & retail trade	0.05	0.04	0.04	0.05	28	27	19	12	-16
Plastic products	0.03	0.01	0.02	0.06	23	7	10	13	-10
Communication	0.00	0.06	0.06	0.06	6	29	24	14	8
Wood & wood products	0.01	0.04	0.07	0.07	15	25	25	15	0
Non-metallic minerals	0.11	0.04	0.03	0.07	35	26	14	16	-19
Other chemicals & man-made fibers	0.11	0.02	0.04	0.08	34	16	17	17	-17
Beverages	0.02	0.01	0.02	0.09	17	11	12	18	1
Tobacco	0.01	0.01	0.03	0.09	14	9	15	19	5
Food	0.17	0.10	0.08	0.09	39	34	28	20	-19
Wearing apparel	0.01	0.03	0.05	0.10	11	20	21	21	10
Finance & insurance	0.11	0.12	0.08	0.10	32	35	27	22	-10
Glass & glass products	0.05	0.07	0.09	0.12	27	30	30	23	-4
Motor vehicles, parts & accessories	0.05	0.03	0.05	0.12	26	22	23	24	-2
Electrical machinery	0.04	0.02	0.05	0.13	25	14	22	25	0
Rubber products	0.02	0.02	0.04	0.16	18	15	18	26	8
Transport & storage	0.19	0.18	0.16	0.16	40	39	37	27	-13
Agriculture, forestry & fishing	0.16	0.14	0.12	0.16	36	37	33	28	-8
Catering & accommodation services	0.16	0.13	0.15	0.17	37	36	35	29	-8
Textiles	0.04	0.05	0.14	0.19	24	28	34	30	6
Metal products excluding machinery	0.03	0.02	0.08	0.19	22	17	29	31	9
Paper & paper products	0.11	0.08	0.18	0.20	33	31	39	32	-1
Coke & refined petroleum products	0.42	0.23	0.15	0.22	43	41	36	33	-10
Television, radio & communication equipment	0.03	0.01	0.04	0.23	20	12	16	34	14
Machinery & equipment	0.09	0.03	0.07	0.33	30	24	26	35	5
Furniture	0.00	0.03	0.04	0.37	8	23	20	36	28
Leather & leather products	0.03	0.08	0.09	0.42	19	32	31	37	18
Coal mining	0.08	0.49	0.45	0.43	29	44	43	38	9
Other industries	0.61	0.27	0.24	0.48	44	42	40	39	-5
Basic chemicals	0.10	0.10	0.18	0.51	31	33	38	40	9
Basic iron & steel	0.17	0.18	0.44	0.53	38	38	42	41	3
Other transport equipment	0.03	0.03	0.12	0.53	21	21	32	42	21
Basic non-ferrous metals	0.20	0.38	0.61	0.56	41	43	44	43	2
Professional & scientific equipment	0.31	0.21	0.33	0.64	42	40	41	44	2
Other mining	0.69	1.24	0.89	0.99	45	46	45	45	0
Gold & uranium ore mining	1.07	1.00	1.05	1.02	46	45	46	46	0
Total	0.12	0.20	0.15	0.17					

Figure 9: Openness high rank indicates high export & import share

achieved in 1980.[26] An understanding of the openness of the South African economy therefore requires a sectoral decomposition, rather than analysis in the aggregate.

There are a number of quite distinct reasons why some sectors prove to be very open. Thus for some sectors, such as Gold & Uranium Ore Mining, openness is almost entirely due to the export orientation of the sector. For others, there is either a preponderance of imports (Printing, Publishing & Recorded Media in 1997 for instance), or relatively signi...cant intra-industry trade (such as Professional & Scienti...c Equipment, which exported 64% of its output in 1997, but imported almost ...ve times the sector's sales on average during the course of the 1990's).

Once again, we note that the evidence on the openness of economic sectors points to the plausibility that the 1990's has witnessed restructuring of South Africa's economic sectors, possibly due to trade reform. Consider the evidence reported in Figure 10. For a number of sectors the average growth in the openness ratio during the course of the 1990's was not only high, but frequently substantially higher than the average growth in pervious time periods. This is particularly noticeable for the following sectors:

2 Other Transport Equipment (23.89%), Furniture (27.06%), Footwear (32.66%), Television, Radio & Communication Equipment (23.58%), Coke & Re...ned Petroleum Products (15.53%), Rubber Products (9.91%), Beverages (12.39%), Leather & Leather Products (12.71%), Non-metallic Minerals (11.04%), Agriculture, Forestry & Fishing (8.12%), Wearing Apparel (10.14%)

Indeed, only four sectors became less open during the course of the 1990's.[27]

Not only were South Africa's economic sectors becoming more open during the course of the 1990's therefore, but in some instances the increase was substantial. However, not all of these substantial changes are attributable to trade liberalization, at least not in isolation or directly. Thus while the strongest growth in openness during the course of the 1990's took place in sectors that liberalized in terms of our EPR classi...cation,[28] there are sectors

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[26] The dip of the 1980's could of course be explained by the period of relative interanational isolation. Sanctions on this evidence do appear to have had an impact.

[27] Medical, Dental & Other Health & Vet. Services, Other Community, Social & Personal Services (Pro...t-Seeking), Gold & Uranium Ore Mining, Basic Non-ferrous Metals.

[28] See particularly Television, Radio & Communication Equipment, Footwear, Furniture

	AvgGrow 1970	AvgGrow 1980	AvgGrow 1990	AvgGrow 1970-97	Rank 1970	Rank 1980	Rank 1990	Rank 70-97
Medical, dental & other health & vet. services	3.97	-8.74	-5.92	-3.75	31	1	1	1
Civil engineering & other construction	-19.29	4.73	7.67	-2.04	1	37	27	2
Other community, social & pers. services (Profit)	0.64	-3.87	-1.27	-1.58	21	9	2	3
Finance & insurance	4.89	-7.93	2.14	-0.57	33	2	12	4
Gold & uranium ore mining	-0.72	0.51	-0.50	-0.21	17	20	4	5
Transport & storage	-2.28	0.59	1.34	-0.09	12	22	7	6
Other industries	-5.48	0.52	5.85	0.31	5	21	21	7
Food	-2.20	-0.63	4.32	0.46	13	17	20	8
Wood & wood products	-2.45	1.28	4.07	0.98	11	25	19	9
Wholesale & retail trade	3.03	-1.98	2.60	1.10	27	13	14	10
Paper & paper products	-2.57	2.64	3.11	1.12	10	30	16	11
Other chemicals & man-made fibers	-8.67	3.83	7.97	1.14	2	32	28	12
Business services	4.41	-1.43	1.31	1.33	32	15	6	13
Motor vehicles, parts & accessories	-4.19	4.72	3.78	1.56	8	36	18	14
Wearing apparel	-6.41	1.01	10.14	1.56	3	24	34	15
Other mining	7.62	-5.08	2.89	1.56	37	6	15	16
Glass & glass products	1.21	-1.82	6.93	1.97	22	14	25	17
Catering & accommodation services	7.23	-2.08	1.60	2.09	35	12	9	18
Agriculture, forestry & fishing	-0.39	0.09	8.12	2.51	18	19	29	19
Textiles	-1.38	2.47	6.62	2.57	15	28	24	20
Other	5.19	-0.16	3.71	2.80	34	18	17	21
Plastic products	-4.90	4.29	9.23	2.93	6	34	31	22
Non-metallic minerals	1.53	-2.62	11.04	3.11	23	11	38	23
Electrical machinery	-3.60	6.66	6.53	3.32	9	40	23	24
Metal products excluding machinery	-1.85	5.41	7.44	3.73	14	38	26	25
Basic chemicals	1.60	3.55	6.42	3.85	24	31	22	26
Basic iron & steel	1.94	7.46	2.43	4.07	26	42	13	27
Leather & leather products	-1.15	1.37	12.71	4.20	16	26	40	28
Professional & scientific equipment	3.41	0.92	8.69	4.22	29	23	30	29
Basic non-ferrous metals	7.80	5.83	-0.91	4.29	38	39	3	30
Printing, publishing & recorded media	1.88	2.58	9.60	4.61	25	29	32	31
Machinery & equipment	-4.60	8.23	10.25	4.75	7	43	36	32
Tobacco	-6.33	11.76	10.70	5.61	4	44	37	33
Beverages	0.29	4.47	12.39	5.67	20	35	39	34
Rubber products	0.27	6.84	9.91	5.71	19	41	33	35
Coke & refined petroleum products	13.25	-5.73	15.53	7.20	39	5	41	36
Coal mining	28.23	-1.17	1.98	9.29	41	16	11	37
Building construction	28.73	-7.31	10.23	9.91	42	3	35	38
Television, radio & communication equipment	3.67	4.22	23.58	10.27	30	33	42	39
Footwear	3.12	-3.21	32.66	10.35	28	10	45	40
Furniture	7.41	2.12	27.06	11.84	36	27	44	41
Other transport equipment	26.70	-4.30	23.89	14.72	40	8	43	42
Electricity, gas & steam	58.75	-5.99	1.87	17.34	43	4	10	43
Communication	74.59	-4.47	0.98	22.69	44	7	5	44
Other community, social & pers. serv (nonprofit)		40.86	1.41		46	45	8	45
Water supply					45	46	46	46

Figure 10: Average growth in openness: high rank indicates high growth

that opened despite little change in their trade regime.[29] Other sectors experienced relatively strong growth in openness despite increased protection as measured in terms of EPR's.[30]

While it is therefore plausible to suggest that a change in trade policy in South Africa is responsible for industry restructuring, this is not likely to be the only cause of changing degrees of openness in the South African economy.

5   Conclusions

This paper has presented a set of new calculations of e¤ective protection rates across South African economic sectors for the 1988-98 period.

We have seen that while there is evidence to suggest that trade liberalization has emerged for some economic sectors, e¤ective protection has remained either constant or increased in others. Thus trade liberalization in South Africa as measured by e¤ective protection rates can be argued to be partial, or incomplete. However, in this context it should be emphasized that e¤ective protection rates are imperfect measures of protection. In the context of South Africa's trade regime, the most important caveat is that they do not correct for quantitative restrictions. Since a signi...cant feature of South Africa's trade liberalization has been the movement from quantitative restrictions to tari¤ lines, our computed e¤ective protection rates are likely to underestimate the extent of trade liberalization.

There is thus scope for further work on the extent of e¤ective protection in South African economic sectors.[31] Since protection has now largely been converted to tari¤ lines, it will be particularly useful to sustain the computation of e¤ective protection rates into the future, in order to be able to identify the e¤ects of trade liberalization over time.

Finally, we note that in terms of export orientation of South African economic sectors, trade liberalization appears to have improved export performance. Moreover, little evidence of harmful import penetration emerges in sectors that have experienced a lowering of e¤ective rates of protection.

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[29] Other Transport equipment experienced strong growth in openness, but no (or at least very little) change in trade liberalization according to our EPR calculations. Other examples to consider include Beverages, Machinery & Equipment, Rubber Products, Non-Metallic Minerals.

[30] See for instance: Food, Agriculture, Forestry & Fishing, Textiles, Leather & Leather Products.

[31] Subject to data availability, the work of Anderson(1998) suggests a way forward here.

This emerges from the fact that the period of strongest trade liberalisation has not been associated with the strongest period of import penetration, and since the growth rate in import penetration is positive both for sectors that have experienced increased trade protection, as well as for sectors that have experienced trade liberalisation. However, it is true that the sectors that have liberalised have experienced stronger growth of international competition (as measured by import penetration) than have sectors that have experienced increased trade protection.

In the light of such evidence, the suggestion that globalization has carried negative consequences for the South African manufacturing sector is at best partial, and at worst misguided.

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