

DO FREE TRADE AGREEMENTS CREATE TRADE FOR SOUTH AFRICA?

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1. Introduction

WHILE TRADE POLICY IN SOUTH AFRICA has been determined in a multilateral setting under the auspices of the Uruguay Round and the WTO, preferential trading agreements have also been pursued as evidenced by the SADC Free Trade Agreement and the EU SA FTA. In addition, South African exporters have recently benefited from preferential access into the US under the African Growth and Opportunity Act (AGOA). These agreements are relatively recent events, for South Africa is also a member of the longest standing customs union in the world – the Southern African Customs Union (SACU), consisting of South Africa, Botswana, Lesotho, Swaziland and Namibia. However, despite multilateral commitments, policy-makers in South Africa continue to negotiate preferential agreements with countries as diverse as the US, India, Brazil and more recently China. Whether these agreements will act as a substitute for MFN trade policy remains to be seen but many economists view these developments with a degree of scepticism given their potential for trade diversion as well as trade creation.

The analysis in this paper supports the view that the EU-SA FTA stimulated both exports and imports, while for SADC exports were stimulated but the results for imports was ambiguous. The AGOA results were far less significant overall, suggesting that preferential access for South African exports into the US had not been particularly beneficial.

This paper attempts to ascertain whether the two free trade agreements, the EU SA FTA, and SADC have had any significant impact on trading patterns for South Africa. Furthermore, although the AGOA arrangements with the United States do not take the form of a free trade agreement, by estimating the impacts on exports and imports separately it is possible to factor this agreement as well into the analysis.

Although these agreements all came into force in 2000/2001 after a period of phased in aggressive trade liberalization under the Uruguay Round, the view may be that insufficient time had passed to enable the impact to be felt. Nevertheless it is our view that sufficient time has elapsed for exporters and importers to have responded and given that the EU-SA agreement is due for review, assessment of these agreements will add to the debate.

Therefore the paper focuses on whether exports from South Africa have increased and whether imports have similarly been affected by the granting of preferential access under the agreements. In addition, the research is able to estimate the role played by changing transport costs over the period 1994 to 2004.

2. Trends in trade

The following graphs provide a picture of the trends in South Africa exports and imports from 1994 to 2004.

Figure 1 demonstrates that both imports and exports for South Africa experienced significant growth in the years 2003 and 2004.

Figure 2 shows that the EU and rest of the world exports increased markedly in 2003 and 2004 despite the strength of the rand during this period.

Figure 3 shows an increase in imports predominantly from the EU (especially Germany) and the rest of the world (especially China, see Appendix 1 Figure A1). While imports from Germany demonstrate significant growth over the period, growth of imports from China has been greater. When the growth of exports and imports from China are compared, clearly the balance of trade is turning in the Chinese direction providing evidence of increasing Chinese investment in the South African economy.

FIGURE 1: TOTAL EXPORTS AND IMPORTS FOR SOUTH AFRICA: 1994 - 2004 (US\$-MILLION)

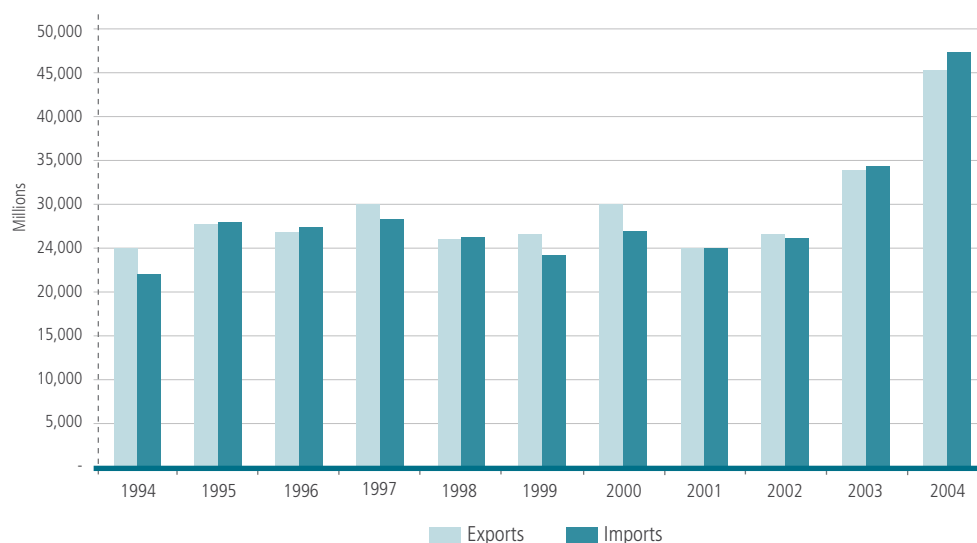
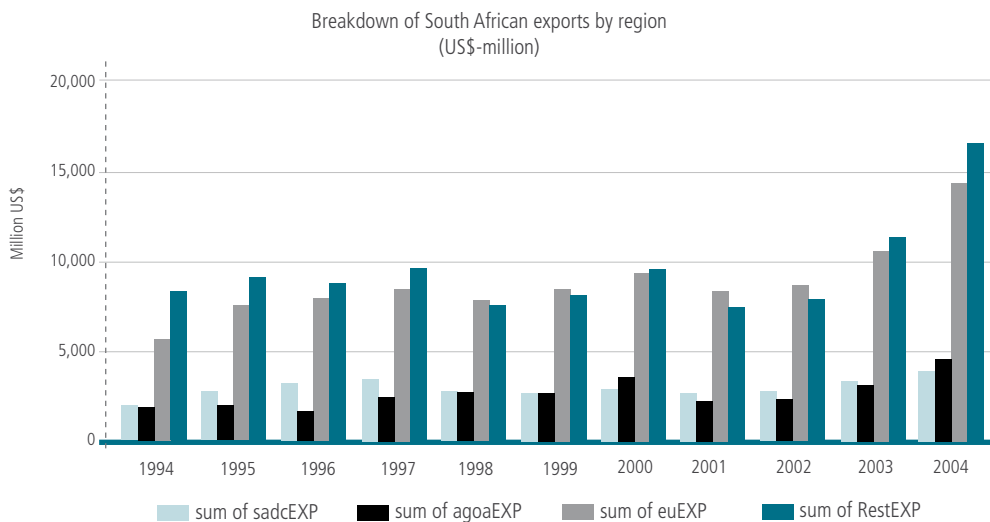
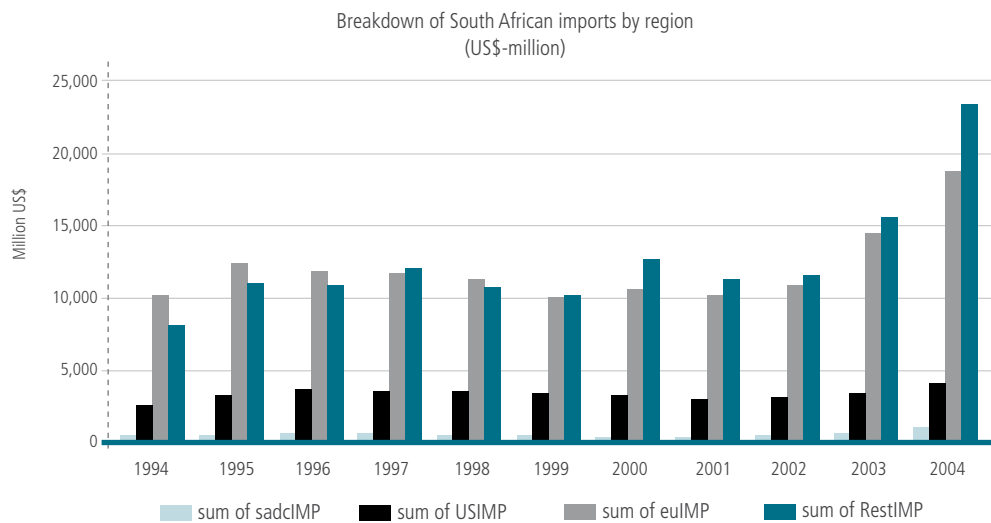


FIGURE 2: EXPORTS BY REGION: 1994 - 2004 (CURRENT US\$-MILLION)



Note: Rest of the world exports only include those countries in the dataset.

FIGURE 3: IMPORTS BY REGION: 1994 - 2004 (CURRENT US\$-MILLION)



Note: Rest of the world imports only include those countries in the dataset.

METHODOLOGY

Given that South Africa has recently entered into two free trade agreements, one with the South African Development Community (SADC) and the other with the European Union (EU), a methodology that attempts to establish the trade increasing effects of both of these agreements relies primarily on application of several regression models.

The regressions distinguish the impact of the agreements based on panel data for South African exports and imports over the period 1994 to 2004. The evidence is derived from equations of the following form:

For South African exports X to country i at time t

$$X_{it} = \alpha + \beta EU + \delta SADC + \partial AGOA + \sum_j \gamma_j Y_{jt} + \varepsilon_{it} \quad (1)$$

For South African imports M from country i at time t

$$M_{it} = \eta + \lambda EU + \omega SADC + \sum_j \nu_j Y_{jt} + \mu_{it} \quad (2)$$

where

- EU , $SADC$ and $AGOA$ are binary dummy variables which are unity for member countries (aside from South Africa) of the two groups and unity for South African exports to the US
- Y s are sets of variables from gravity models
- ε and μ are well behaved residuals.

Feenstra (2002) divides estimation of a gravity type equation in three approaches. Firstly, price indices can be used to measure price effects (Bergstrand, 1989); secondly border effects can be used to measure price effects indirectly (Anderson and van Wincoop, 2002), and finally, fixed effects can be used for the source of imports and destination of exports. Given the difficulties of specifically modeling the price implications of the agreements, the second approach was used. We ruled out the use of fixed effects for reason of wishing to estimate the impact of distance on South African trade.

More recently the division of markets spatially has been successfully modeled by applying gravity variables relating to economic mass and we follow this approach in the paper. The variables included are as follows: relative GDP, population, and the distance between trading partners. (Rose 2004, Anderson and Wincoop, 2002). Using border effects for the trading agreements in the form of dummy variables, once the agreements were effective, it is possible to ascertain whether the trading agreements had shifted trade for South Africa.

Thus, the conditioning variables Y above include the specific country GDP vis a vis South African GDP; specific country population vis a vis South African population and the distance from the South African port to the specific country port of entry. When the estimating equation is expressed in log linear terms it follows that

$$\text{LogTrade}_{ij} = b_1 + b_2(\text{Log}Y_i Y_j) + b_3(\text{Log}P_i P_j) + b_4 \text{Log}D_{ij} + b_5 EU + b_6 SADC + b_7 AGOA + h_{ij} \quad (3)$$

For the export equation the $AGOA$ dummy is included whereas for imports it is excluded. The South African data is represented by the subscript j and the trading partners by the subscript i .

3. Estimation results

The data are summarised in Table 1. Given that suitable deflators are not available for trade from and to the trading partner countries, South African exports and imports are measured in nominal US dollars converted at average for the year market exchange rates. GDPs are measured in constant US dollars and distance in thousands of kilometres. Data sources and the list of countries can be found in Appendix 1.

3.1 Cross-section results

Initially the model in equation 3 was estimated as individual cross sections for each year for both exports and imports. The results are shown in Tables 2 and 3. Table 2 shows the estimation results for exports from South Africa to 136 countries for each year from 1994 to 2004.

The estimated coefficients on relative GDPs and population were of the expected signs from gravity equation theory, namely that GDP is significantly and positively related to trade while populations were negatively related. While larger countries tend to be more self sufficient, the emergence of countries such as China and India as major trading nations is

TABLE 1: SUMMARY STATISTICS OF THE MODEL DATA 1994 - 2004 FOR 136 COUNTRIES

	1994	1996	1998	2000	2002	2004
Exports (US\$-million)						
Mean	131.40	158.28	153.64	186.21	159.39	288.10
Standard deviation	327.69	378.24	387.04	500.41	382.67	732.54
Minimum	0.00	0.00	0.00	0.00	0.11	0.04
Maximum	1 857.06	2 976.76	2 721.74	3 605.38	2 411.38	4 529.39
Imports (US\$-million)						
Mean	156.03	196.93	189.88	196.55	189.09	345.01
Standard Deviation	497.92	591.60	543.12	541.94	536.09	910.26
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	3 734.16	4 050.91	3 752.04	3 585.16	4 066.71	6 728.66
GDP (US\$-million)						
Mean	188 996	200 848	212 875	228 346	235 412	249 563
Standard deviation	786 056	833 419	891 839	956 539	979 301	1 037 948
Minimum	86	85	99	108	108	127
Maximum	7 775 500	8 271 400	9 012 500	9 764 800	10 342 992	10 663 625
Population (millions)						
Mean	38.68	39.78	40.84	41.87	42.72	43.85
Standard Deviation	131.61	135.15	138.62	141.88	144.92	148.51
Minimum	0.01	0.01	0.01	0.01	0.01	0.01
Maximum	1 191.84	1 217.55	1 241.94	1 262.65	1 280.40	1 303.55
Distance (km'000)						
Mean	11.12					
Standard Deviation	3.63					
Minimum	1.50					
Maximum	19.00					

altering the negative significance of population. Distance is also shown to be significant and, interestingly, surprisingly high when compared with other estimates for gravity equations.

The elasticity on the distance variable for exports is estimated to decline from -4.93 in 1994 to -3.11 in 2004. Estimates of the distance elasticity in other studies is usually in the range of -0.5 to -1.0. (Coe et al, 2002). The high elasticity for South African exports demonstrates the remoteness of South Africa located as it is at the tip of Africa, from its major markets in Europe, the US and East Asia. It is encouraging however that contrary to other studies (See Coe et al, 2002) that have estimated constant distance coefficients over time, that the South African elasticity for exports is declining.

More importantly the coefficients on the dummy variables for the free trade agreements appear to demonstrate that in only one year was preferential access important for South African exports. EU exports were shown to be affected by the free trade agreement in 2002. On the other hand neither the SADC nor AGOA access were significant demonstrating in the first place that access into the US market had not been particularly beneficial given the caveats attached to such preferential access. In the case of SADC this result is not surprising given the asymmetrical phase in of the agreement. Once the estimations were done in panel form, these results

were found to be more favourable towards the impact of the agreements on trade over the entire period.

Table 3 shows the estimations for South African imports. Again the GDP and population variables behave as expected from gravity equations. The distance variable is also a significant determinant of imports but interestingly the elasticity on the variable is not as high as it is for exports. Although the elasticity declines from -3.66 in 1994 to -2.73 in 2004 this decline is not continuous. We are of the view that the difference in the distance elasticities between exports and imports reflects the difference in the composition of trade. South Africa is a major exporter of bulk lower value goods while importing higher value intermediates, consumer and capital goods hence accounting for the difference in these coefficients. The higher elasticity of the distance coefficient for exports also reflects the impact of competition from suppliers of substitutable goods that are closer to the main markets of the developed world. Whereas South Africa sources most of its imports from the developed world, and therefore has less choice in substituting sources of supply that are closer.

The EU dummy in the import equation is found to be significant in the years 2003 and 2004, probably due to the asymmetrical phase-in that favoured South African access into the EU and delayed EU access into the South African market. Therefore, the finding of a later response on the import side is not surprising.

TABLE 2: CROSS-SECTION ESTIMATES FOR EXPORTS: 1994 - 2004

	GDPs	Populations	Distance	Constant	EU	SADC	AGOA
Exports dependent variable							
1994	1.73*	-0.54*	-4.93*	-21.91*	-	-	-
1995	1.52*	-0.34***	-4.34*	-19.25*	-	-	-
1996	1.46*	-0.34**	-4.29*	-17.75*	-	-	-
1997	1.40*	-0.35**	-4.09*	-16.68*	-	-	-
1998	1.48*	-0.43*	-4.29*	-17.35*	-	-	-
1999	1.31*	-0.24***	-3.85*	-15.51*	-	-	-
2000	1.39*	-0.34*	-4.14*	-16.01*	-	-	-
2001	1.28*	-0.21***	-3.90*	-14.75*	0.26	0.34	-0.15
2002	1.08*	-0.18**	-2.96*	-12.34*	0.38	0.96**	0.40
2003	1.09*	-0.12	-3.25*	-12.52*	0.50	0.64	0.33
2004	1.11*	-0.15	-3.11*	-13.16*	-0.09	0.64	0.25

Note:

- (1) * Significance at 1% level or higher
- (2) ** Significance at 5% level
- (3) *** Significance at 10% level
- (4) Robust standard errors computed

TABLE 3: CROSS-SECTION ESTIMATES FOR IMPORTS: 1994 - 2004

	GDPs	Populations	Distance	Constant	EU	SADC
Imports dependent variable						
1994	1.85*	-0.60*	-3.66*	-27.77*	-	-
1995	1.66*	-0.42*	-2.89*	-25.82*	-	-
1996	1.65*	-0.44*	-3.03*	-24.88*	-	-
1997	1.66*	-0.44*	-3.04*	-24.74*	-	-
1998	1.76*	-0.54*	-2.58*	-27.29*	-	-
1999	1.73*	-0.55*	-2.89*	-25.87*	-	-
2000	1.81*	-0.54*	-2.73*	-27.95*	-	-
2001	1.81*	-0.58*	-3.03*	-26.90*	0.09	0.28
2002	1.58*	-0.35**	-2.60*	-23.61*	0.18	0.23
2003	1.63*	-0.34*	-2.71*	-25.99*	0.70**	1.07
2004	1.66*	-0.26**	-2.73*	-27.05*	0.72**	1.09

Note:

- (1) * Significance at 1% level or higher
 (2) ** Significance at 5% level (3) *** Significance at 10% level
 (4) Robust standard errors computed

3.2 Panel estimations

Given the nature of the data, it was also decided to run panel estimations of the gravity equations for both exports and imports. The distance variable is time invariant, therefore fixed effects estimations were not used as we were interested in estimating the impact of distance in the model and checking this against the cross section work¹. Generalised least squares estimations assuming heteroskedastic panels with common autoregressive first order coefficients of all panels were performed on the data (Tables 4 and 5). The estimated coefficients of the gravity variables were found to be similar to the average of the annual estimates suggesting that the pooling of the data into the panels is valid.

In Table 4, since the regressand is the natural logarithm of exports, the impact of the agreements over the period since the agreement had been in place is estimated to raise South African exports by 33 percent for the EU (since $\exp(0.286) - 1 = 0.33$), by 50 percent for SADC (since $\exp(0.405) - 1 = 0.50$) and 3 percent for the AGOA² (since $\exp(0.032) - 1 = 0.03$). The elasticities on the other variables are of the expected sign and significance. The elasticity on the distance variable in the panel estimates is -3.33 for exports.

¹ In fixed effects estimations time invariant variables are dropped.

² The coefficient on the AGOA variable was found not to be significantly different from zero anyway.

In Table 5, the impact of the agreements over the period is estimated to raise South African imports by 53 percent (since $\exp(0.42) - 1 = 0.53$) from the EU and 80 percent from SADC (since $\exp(0.59) - 1 = 0.80$). Both the free trade agreements had stimulated trade for those countries selling into the South African market.

Once again the elasticities on the other variables were found to be of the expected sign and significance. The distance elasticity for imports is -2.41. This value is lower than in the cross section work and certainly lower than it is for exports.

While our data for exports and imports are measured in nominal terms, namely US dollars, we included time effects to absorb the effects of inflation in the following regression. (See Frankel et al, 1997 and Coe and Hoffmaister, 1999). Thus, additional linear time trends were included for the distance, GDP and population variables as well as the dummy variables. These results are shown in Tables 6 and 7 for exports and imports respectively. Once again the estimated coefficients are similar to the average annual estimates in the cross section estimates suggesting that the time dummies do address the problem of deflating the trade data.

The addition of the linear time trends shows that, where they are significantly different from zero, the signs of the interactive time trend variables imply that the absolute value of the estimated coefficients decline over time.

TABLE 4: PANEL ESTIMATES FOR LOG EXPORTS AS DEPENDENT VARIABLE

Variable	Coefficient	Standard Error	z	P>z
Log GDPs	1.08	0.03	36.97	0.000
Log populations	-0.06	0.03	-2.07	0.039
Log distance	-3.33	0.11	-31.32	0.000
EU	0.286	0.07	3.80	0.000
SADC	0.405	0.115	3.54	0.000
AGOA	0.032	0.22	0.15	0.88
Constant	-12.60	0.44	-28.77	0.000

Note: Coefficients were estimated by generalised least squares assuming heteroskedastic panels with common autoregressive first-order coefficients of all panels.

TABLE 5: LOG IMPORTS AS DEPENDENT VARIABLE

Variable	Coefficient	Standard Error	z	P>z
Log GDPs	1.46	0.02	50.72	0.000
Log populations	-0.29	0.03	-9.21	0.000
Log distance	-2.41	0.097	-24.65	0.000
EU	0.42	0.071	5.86	0.000
SADC	0.59	0.15	3.89	0.000
Constant	-22.41	0.47	-47.59	0.000

Note: Coefficients were estimated by generalised least squares assuming heteroskedastic panels with common autoregressive first-order coefficients of all panels.

The distance variable is initially significantly negative and becomes less so over time (because the trend is positive). The SADC, EU and AGOA, in contrast, are significantly positive and declining over time³. This finding is only confirmed in the cross section estimations for the distance variable.

The inclusion of the interactive linear time trends into the import equation led to much the same results as previous estimations, except for the SADC dummy and its time trend and the distance time trend. The SADC time trend appears to have completely reduced the value of the access for SADC members into the South African market.

This finding could be related to the view that many SADC countries had, prior to the agreement, enjoyed some preferential access under bilateral agreements with South Africa and therefore the value of additional access under the FTA was low⁴. The EU agreement remains a significant determinant of

imports into South Africa. Interestingly, the impact of distance on imports over time, in contrast to exports is found to be insignificantly different from zero.

On closer examination of the cross-section estimates, the distance coefficients are not monotonically declining over the period. The fact that the population trend is more significant and positive for imports than for exports is a reflection of the increased proportion of imports originating in China.

³ The distance, EU, SADC and AGOA trend variables are all found to be significantly different from zero. The fact that the trend variables on GDP and population were insignificant suggests that their explanatory effects remained relatively constant over time.

⁴ Zimbabwe, Zambia, Malawi and Mozambique had agreements that had been negotiated during the apartheid era.

TABLE 6: LOG OF EXPORTS AS DEPENDENT VARIABLE

	Coefficient	Standard Error	Z	P> Z
Log GDPs	1.30	0.02	60.27	0.000
Log GDPs x trend	-0.002	0.003	-0.57	0.570
Log population	-0.26	0.031	-8.36	0.000
Log populations x trend	0.005	0.005	1.04	0.300
Log distance	-4.29	0.132	-32.39	0.000
Log distance x trend	0.06	0.022	2.64	0.008
EU	1.54	0.375	4.09	0.000
EU x trend	-0.18	0.04	-4.43	0.000
SADC	2.37	0.89	2.66	0.008
SADC x trend	-0.199	0.09	-2.11	0.035
AGOA	1.01	0.52	1.95	0.052
AGOA x trend	-0.15	0.05	-2.74	0.006
Constant	-15.04	0.19	-79.27	0.000

Note: Generalised least squares estimates of coefficients with heteroskedastic panels. The trend is equal to 1 in 1994, 2 in 1995 ... and 11 in 2004.

TABLE 7: LOG OF IMPORTS AS DEPENDENT VARIABLE

	Coefficient	Standard Error	Z	P> Z
Log GDPs	1.69	0.022	75.27	0.000
Log GDPs x trend	-0.00	0.003	-0.19	0.851
Log population	-0.54	0.34	-15.84	0.000
Log populations x trend	0.01	0.005	2.14	0.032
Log distance	-2.92	0.102	-28.80	0.000
Log distance x trend	0.02	0.019	1.34	0.18
EU	1.77	0.466	3.79	0.000
EU x trend	-0.17	0.049	-3.49	0.000
SADC	0.187	0.912	0.21	0.837
SADC x trend	0.06	0.098	0.57	0.57
Constant	-25.70	0.288	-89.28	0.000

Note: Generalised least squares estimates of coefficients with heteroskedastic panels. The trend is equal to 1 in 1994, 2 in 1995 ... and 11 in 2004.

4. Conclusion

This research shows that the impact of economic mass in terms of GDPs and population is found to be in accord with gravity theory. Distance (or transport costs) is shown to play an important role in determining the volume of exports and imports. While trading partners closer to South Africa have a comparative advantage, exports from South Africa experience a greater impact on the volume traded than imports into South Africa. This finding can be explained by the composition of trade in exports and imports. Exports from South Africa are high bulk and expensive to transport while imports are largely high value and proportionately cheaper to transport. Furthermore, over time the impact of distance on South African exports is shown to be declining while its impact on imports into South Africa remains relatively unchanged.

In the main the results for trade agreements in the cross-section and panel estimates are different. Whereas the cross-sections appear to show little impact, both the panel estimates, with and without the time trend, indicate positive impacts for the trade agreements (with the exception of the SADC agreement in the time trend analysis for imports). The panel analysis introduces a time element and thus a dynamic aspect to the analysis and the phasing in of the agreements. The cross-sectional analysis provides only a static snapshot picture, comparing the effects of GDP, population and distance on the level of trade along with the effect of the agreement dummies. The panel analysis, on the other hand, examines the changing impacts of the agreements over time, whilst controlling for the changes in the gravity variables.

A major limitation of this research lies in the absence of suitable deflators for bilateral trade requiring the use of trade to be measured in current US dollars. An extension of this work could be to experiment with alternative proxy deflators to test the sensitivity of the results. In addition, future research should disaggregate the data by commodity allowing for individual price effects. The work so far has averaged across all exports and imports. While this may also be viewed as a limitation of the research it nevertheless does answer the question posed at the beginning of this project, namely, to ascertain whether in general exports and imports have changed as a result of the agreements. The panel analysis supports the view that the EU-SA FTA stimulated both exports and imports, while for SADC exports were stimulated but the results for imports was ambiguous. The AGOA results were far less significant overall, suggesting that preferential access for South African exports into the US had not been particularly beneficial.

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Appendix 1: Countries and data sources

The countries included in the study numbered 136 in total. These countries had traded with South Africa over the period 1994 to 2004. During some years when either imports or exports were zero log values were taken on the value one.

GDP, population and South African exports and imports by trading partner were obtained from the TIPS database. Distance between trading partners and South Africa were obtained from Holden (1996).

Albania	Ecuador	Malaysia	Thailand
Algeria	Egypt	Maldives	Togo
Angola	El Salvador	Mali	Trinidad and Tobago
Anguilla	Estonia	Malta	Tunisia
Antigua and Barbuda	Ethiopia	Mauritius	Turkey
Argentina	Finland	Mexico	Uganda
Armenia	France	Moldova	Ukraine
Australia	Gabon	Morocco	United Arab Emirates
Austria	Germany	Mozambique	United Kingdom
Bahamas	Ghana	Nepal	United States
Bangladesh	Greece	Netherlands	Uruguay
Barbados	Guatemala	New Zealand	Venezuela
Belgium	Guinea	Niger	Vietnam
Belize	Guinea-Bissau	Nigeria	Yemen
Benin	Guyana	Norway	Zambia
Bolivia	Haiti	Oman	Zimbabwe
Brazil	Honduras	Pakistan	
British Virgin Islands	Hong Kong	Peru	
Bulgaria	Hungary	Philippines	
Burkina Faso	Iceland	Poland	
Burundi	India	Portugal	
Cambodia	Indonesia	Republic of Korea	
Cameroon	Iran	Romania	
Canada	Ireland	Russian Federation	
Cayman Islands	Israel	Samoa	
Central African Republic	Italy	Saudi Arabia	
Chile	Jamaica	Taiwan Province of China	
China	Japan	Tanzania	
Colombia	Kazakhstan	Senegal	
Comoros	Kenya	Seychelles	

FIGURE A1: SOUTH AFRICAN EXPORTS BY MAJOR TRADING PARTNER: 1994 - 2004 (CURRENT US\$-MILLION)

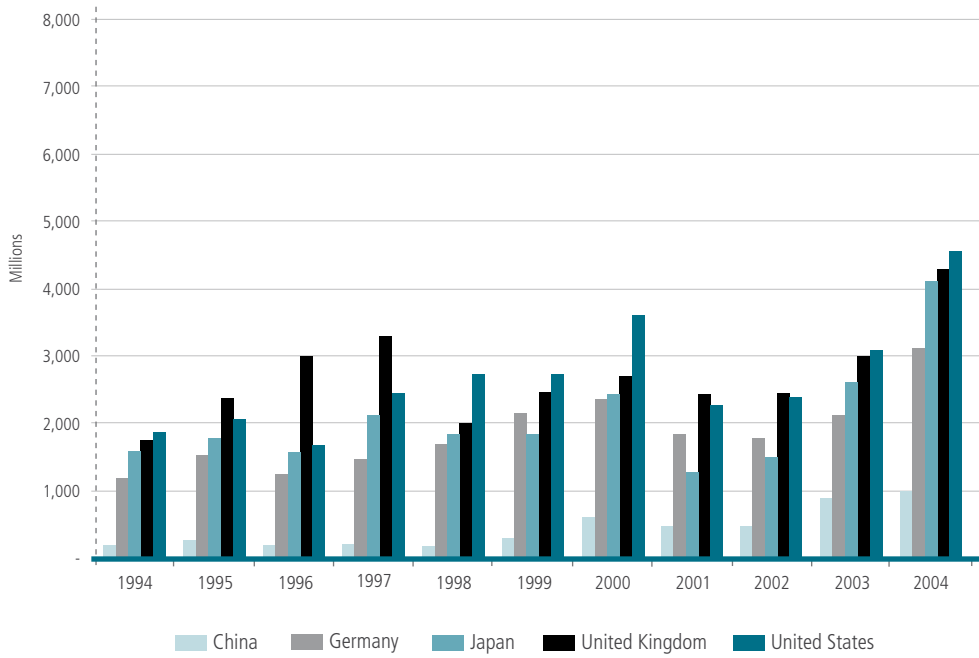


FIGURE A2: SOUTH AFRICAN IMPORTS BY MAJOR TRADING PARTNER: 1994 - 2004 (CURRENT US\$-MILLION)

