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AN ASSESSMENT OF THE TRADE RELATIONSHIP BETWEEN AUSTRALIA AND SOUTH AFRICA

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This paper examines the trade relationship between Australia and South Africa to assess if it is justifiable to establish a FTA between these two countries. The paper uses the cointegration analysis to examine the long-term trade relationship between these two countries. The results suggest that Australian-South African trade has unique features which indicate that its growth is not just a reflection of overall world trade. The paper also uses a simultaneous equations model to test if there are significant feedback effects in Australian trade with South Africa. The results suggest that intensification of the trade relationship would be beneficial to both countries.

JEL Classification: F1

I. INTRODUCTION

It is now widely accepted as a tenant of public policy that liberalisation of world trade will result in beneficial economic growth and development. Trade liberalisation leads to growth in real GDP directly through an increase in real exports (the export-led growth hypothesis) or indirectly by enhancing the relationship among trade determining variables (Giles, *et al.* 1993). However, more recently, due to the failure of the Cancun round of World Trade Organisation negotiations, there has been increasing interest in the issue of developing free trade agreements (FTA) or regional trading associations (RTA) among defined sets of countries. Countries are now moving rapidly into these types of trading arrangements, with a fear of being left out should the world economy form into tripolar trading blocs–Americas, Europe and Asia (Bhagwati, 1999; Lloyd and MacLaren, 2004). Two countries that could potentially be excluded from these blocs are Australia and South Africa, situated at the bottom of the world and thus not natural partners within the emerging blocs.

In this paper, the existing trade relationship between Australia and South Africa is assessed using two statistical tests. These establish that there has been increasing trade between the two countries, which has occurred above the overall growth in world trade in recent decades. The paper addresses the question of whether there is enough evidence within this strengthening trade relationship to justify establishing a more formal trade relationship. One possible outcome of this, given the current global trade environment, is a FTA between Australia and South Africa.

A recent analysis of economic remoteness, measured as the per centage of world GDP occurring within an increasing kilometre distance from the country of interest, placed Australia and South Africa as the world's most remote countries other than New Zealand (Ewing and Battersby, 2005). Perhaps because of this, the two countries have collaborated on a number of geo-political negotiations, including the Cairns Group within WTO rounds, conservation of Antarctic resources, new world wine producers, conflict diamonds and fisheries protection (DFAT 2005). Thus a commonality of interest already exists between the two countries implying that there is a reasonable level of trust available on which to build a trading agreement. This raises the question of whether these two countries should consider reformulating their trading relationship to take advantage of the opportunities inherent in more specific trading arrangements.

The first statistical test used in this paper examines whether there is a long-term relationship between Australian trade with South Africa and Australian trade with other countries. This test involves co-integration analysis. If there is no evidence of co-integration, i.e. no long-term relationship between Australian trade with South Africa and Australian trade with other countries, this suggests that the two variables can drift apart from each other more and more as time goes on. Further analysis indicates that the relative magnitude of Australian trade with South Africa has been increasing over-time. The second test analyses whether there are feedback effects in the trade relationship between Australia and South Africa. This test is carried out through the development and estimation of a simultaneous equations model, and indicates that the growing trade relationship has been mutually reinforcing.

The paper is divided into five sections. Section one gives a review of relevant empirical studies. Section two examines the growth in trade between Australia and South Africa over the last quarter of the twentieth century. Co-integration analysis of trade between the two countries is undertaken in Section three. The test of feedback effects in the trade relationship between Australia and South Africa is carried out in Section four. Finally, the main conclusions of the paper are summarized in Section five.

II. REVIEW OF EMPIRICAL STUDIES

The relationship between export expansion and economic growth has been of significant interest to the economics profession for several decades (Ghatak, et al. 1997). However, empirical testing of this export-led growth hypothesis has produced mixed results. Earlier studies used cross-sectional data from a range of different countries, and generally provided strong support for the export-led growth hypothesis. Nevertheless, careful interpretation of these results suggested that exports may be simply acting as a proxy for 'openness' and that this may be the important determinant of growth, not exports per se. It also appeared that the relationship between exports and investment was often the main determinant of growth in many circumstances (Greenaway and Sapsford, 1994).

The export-led growth hypothesis is based on an implicit assumption of a general trade liberalisation by the country involved. Most recent developments in freeing trade have involved bilateral or regional agreements. Analyses of the impact of free trade agreements has, more recently, involved the use of major macroeconomic computerised general equilibrium modelling (CGE). The Michigan Model has been used to analyse the impacts of free trade agreements negotiated with the U.S.A. It incorporates aspects of imperfect

competition, including monopolistic competition, increasing returns to scale and product variety. However, it does not allow for other indirect impacts of trade expansion on foreign direct investment, capital formation, productivity or technological change in affected sectors. The welfare effects of a FTA arise from terms-of-trade effects due to changes in relative prices of products to parties within the agreement compared to prices to the rest of the world plus efficiency gains from trade and the realisation of economies of scale. While the welfare effects from these efficiency gains are expected to be positive, the impact of the terms-of-trade effect can be positive or negative, depending on the level of trade diversion created due to rising prices to the rest of the world (Brown, *et al*. 2005).

Cointegration is now widely used to analyse various aspects of trade relationships. Studies by Giles, et al. (1993) in New Zealand and Sharma and Panagiotidis (2005) in India found no support for the export-led growth hypothesis following trade liberalisation in those countries. However, evidence of a shift in exports towards manufactures following trade liberalisation with a beneficial effect on long run output growth were found in Spain (Sanso and Montanes 2002, Balaguer and Cantavella-Jorda 2004). Their studies indicate that cointegration analysis can be used to model the impact of trade liberalisation through free trade agreements, particularly where manufactures are an important component in the affected trade flows.

Gravity models have been used to analyse international trade flows since the early 1960s. In the standard model, exports from one country to another are explained by economic size (GDP or GNP), population, geographical distance and dummies included to represent institutional factors. More recently, foreign direct investment flows, indices of trade complementarity, exchange rates and per capita incomes have been included, while dummies are used for factors such as common language, adjacent or common borders, and particularly relevant to our purposes, the effects of preferential trading agreements (Martinez and Nowak 2003, Otsubo and Umemura 2003). Gravity modelling often supports the role of trade agreements as a means of increasing the benefits from trade. Studies by Martinez and Nowak (2003) and Otsubo and Umemura (2003) found that membership of regional trade agreements fostered intra-bloc trade. Their findings in relation to inter-bloc trade were mixed, and that North-South agreements were more significant than the South-South ones. Gravity models give significant weight to the transaction costs of trade (transport and communications), and thus tend to find the greatest benefits from trading agreements when countries are in close geographic proximity. Australia and South Africa do not fit this pattern. Thus, the question is whether other arguments can be raised to support the development of closer trading arrangements between countries that do not naturally form trading blocs.

The literature on feedback effects of foreign trade has intensified during the past three decades. Feedback effects imply that trade between two countries is mutually reinforcing and has beneficial growth effects on both economies. It does not rely on these countries being in the same region or trading bloc. This analysis involves applying a simultaneous equation model to test the dynamic relationship between international trade and growth. Salvatore (1983) first applied this approach to fifty-two developing countries during the period 1961-78. Tamascke (1990) tested the relationship between exports and income of Queensland and Alberta during 1961-83. Esfahani (1991) tested the interdependence of exports, GDP and imports for 31 semi-industrialized countries excluding the major oil exporters during 1960-73, 1973-81 and 1980-86. Metwally and Vadlamudi (1992) analysed

the trade relationship between Australia and fifteen Middle-Eastern countries during the period 1971-88. None of these studies found any feedback effects in these trading relationships.

However, feedback effects were found in the study by Lee (1989) in the relationship between imports, exports and GDP between Taiwan, South Africa and Japan. Metwally and Tamaschke (2001) also identified a significant feedback effect in the relationship between the rate of growth of the European Union and the Gulf Cooperation Council's demand for imports. Thus feedback effects are not always present in trade relationships. The identification of such effects support the argument that there will be a beneficial impact on both economies from intensifying trade through bilateral relationships.

III. GROWTH IN TRADE BETWEEN AUSTRALIA AND SOUTH AFRICA

Table 1 reveals that trade between Australia and South Africa has grown significantly since 1990. As the volume of trade has grown, so has the relative importance of each country as a trading partner. South Africa is now Australia's 16th most important export destination, and Australia is South Africa's 10th most important source of imports. Australia is South Africa's 13th most important export destination, and Australia is its 24th most important source of imports (Hodgkinson and Jordaan 2005).

The pattern of trade between the two countries indicates that it is relatively complementary. Australia predominantly exports natural resources such as alumina, coal, petroleum and nickel. It has some manufactured exports including aircraft and parts, passenger motor vehicles and chemicals and related products. South African exports to Australia, on the other hand, are predominantly manufactures such as passenger motor vehicles, furniture, pig iron, televisions, paper and board and specialised machinery. These products reflect its comparative advantage in labour, which has attracted a number of foreign investors from Europe. This trade is currently dominated by alumina (45% of total exports to South Africa) and passenger motor vehicles (44% of total exports to Australia). However, the value of most other major trade items has grown in recent years, indicating that diversification of trade is also occurring (Hodgkinson and Jordaan 2005 based on DFAT 2004 data).

Both countries have also undertaken significant reforms of their tariff structures. Reform began in South Africa in the early 1990s, and the average manufacturing tariff was 4.9 per cent in 2004. The only sectors in South Africa still to have high tariffs are clothing, textiles, footwear, motor vehicles and furniture (IDC 2005). Australia's tariff on most manufactured products has been reduced from 24 per cent in 1980 to five per cent in 2001. The only products with higher tariffs are textiles, clothing, footwear and leather, motor vehicles and parts, and wood and wood products (DFAT 2001). Of these, motor vehicles are of most interest to the analysis of Australia–South Africa trade. Both countries export passenger motor vehicles to each other, and both still have significant tariffs on this sector. Thus one particular benefit of a FTA may be to accelerate this intra-industry trade, to the mutual benefit of producers in both countries.

The reduction in Australian tariffs on manufacturing products and the reduction in South African relative export prices had resulted in a significant increase in Australian imports from South Africa as witnessed from the following OLS estimation results, using annual data for the period 1980-2001.

$M_{A\text{-}SA} = 1127.051 - 24.165\ A_{tar} - 5.648\ P_{SA}$
(0.448) (-6.176)** (-2.349)**
$R^2 = 0.662$; F = 20.564. n = 24; DW = 1.764

Where:

$M_{A\text{-}SA}$ = Australian imports from South Africa

A_{tar} = Australian rate of general tariffs on manufactured products

P_{SA} = South African export prices relative to those of industrialized countries

** Significant at 5 per cent confidence level

Table 1
Australia trade with South Africa over the period 1980-2003

Year	*Total Australian Exports US$m*	*Total Austraian Imports US$m*	*Australian Exports to South Africa US$m*	*Australian Imports from South Africa US$m*	*Australian Exports to South Africa as % of total Australia Exports %*	*Australian Imports from South Africa as % of total Australia Imports %*	*Australian Exports to South Africa as % of total South African Imports %*	*Australian Imports from South Africa as % of total South African Exports %*
1980	21944	22399	131	135	0.57	0.58	0.66	0.74
1985	22604	25889	113	120	0.50	0.46	0.99	0.73
1990	39752	41985	93	102	0.23	0.24	0.51	0.39
1995	53111	61283	482	298	0.91	0.49	1.58	1.07
2000	63387	71531	729	541	1.15	0.76	2.45	2.03
2003	70596	90202	863	821	1.22	0.91	2.47	2.23

Sources: IMF: *Direction of Trade Statistics*, Yearbook, (Various issues), International Monetary Fund, Washington, D.C.

IV. LONG TERM RELATIONSHIP BETWEEN AUSTRALIAN TRADE WITH SOUTH AFRICA AND AUSTRALIAN TOTAL TRADE

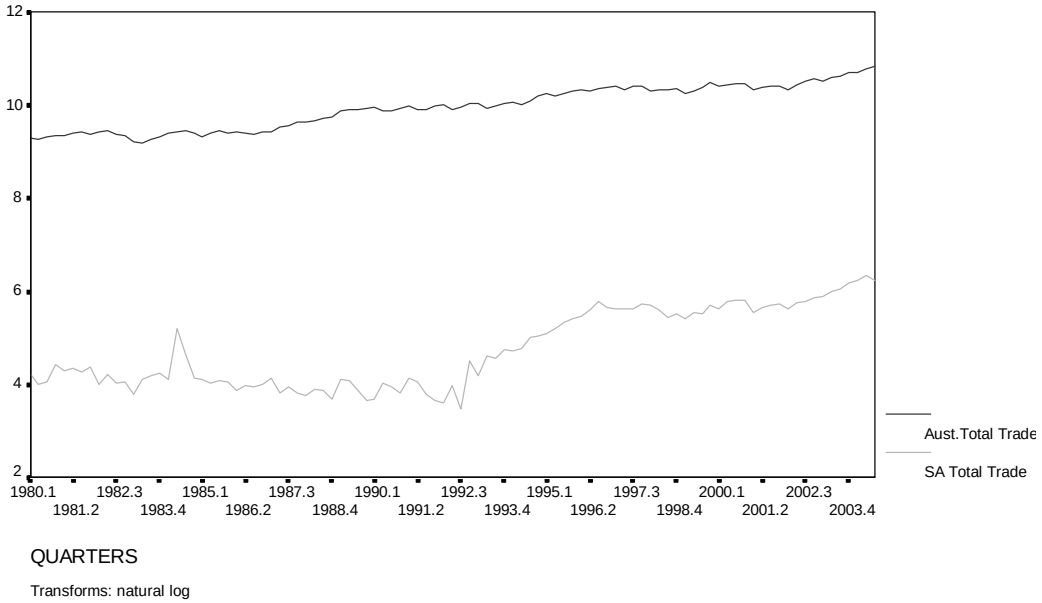
The aim of this section is to test if there is a long-term relationship between Australian trade with South Africa and Australian total trade. If such a relationship exists, this would suggest that the two variables do not drift too far apart from each other over time. In other words there is evidence of cointegration between the two variables. This would imply that the growth in Australian–South African trade is simply a reflection of overall growth in Australian world trade and has no unique relationship to the characteristics of bilateral trade between these two countries. However if there is no evidence of cointegration, the relative magnitude of Australian trade with South Africa may be increasing or decreasing over-time, compared with total trade. If there is evidence of an increase in the relative magnitude of trade between Australia and South Africa, this would suggest that closer trade relationships between the two countries are more likely to be trade creating and would raise their economic welfare over time. Figure 1 gives a priliminary idea about Australian total trade and Australian trade with South Africa over 99 quarters starting 1980. This graph suggests that the two variables drift too far apart from each other over time.

The co-integration results in Table 3 indicate that the LR tests based on maximal eigenvalue of the stochastic matrix and the trace of the stochastic matrix suggest that the null hypothesis of no cointegration cannot be rejected. Thus, there is no evidence of a long

term relationship between Australian trade with South Africa and Australia's total trade. In other words, Australian trade with South Africa and total trade of Australia drifted apart from each other more and more as time went on.

This paper uses the cointegration technique to examine the long-term relationship between Australian total trade and its trade with South Africa. If a long-run relationship exists between Australian trade with South Africa and Australia's total trade, the two variables must form a unique cointegrating vector. In order to test for cointegration, and in particular to investigate whether a unique cointegrating vector can be identified, we have employed the maximum likelihood estimation technique developed by Johansen (1988) and Johansen and Juselius (1990). This approach does not have the now well-documented drawbacks of the Engle and Granger (1987) approach to cointegration and can be used in a multivariate setting to establish the numbers of distinct cointerating vectors (Ng and Perron, 1997).

Figure 1: Australian Total Trade and South African Trade with Australia



The first step in implementing this approach is to test for the order of integration of each variable included in the model. It is a common practice to apply the Augmented Dickey –Fuller Test (ADF) given by the following equation for variable Z.

$$Z_t = \alpha + \beta Z_{t-1} + \Sigma^{k}_{i=1} \tau i \, \Delta Z_{t-1} + \omega_{t,}$$

Where, ω is an error term (Dickey and Fuller 1979, Dickey and Rossana, 1994).

The cumulative distribution of the ADF test statistic is provided by Mackinnon (1991). If the calculated (absolute) statistics is greater than its critical value, then Z is said to be stationary or I(0). Table 2 represents the results of the Augmented Dickey–Fuller test. The estimation is based on a total of 95 observations for the period 1981Q1 to 2003Q3. The Augmented Dickey-Fuller regressions include an intercept and a linear trend.

It is clear that the calculated (absolute) statistics are greater than the critical value for the variables representing Australian trade with South Africa and total Australia trade only for the differenced variables. This indicates non-stationarity of these variables at the level and that the variables have achieved stationarity after being differenced once. Thus, the variables are integrated of order one, I(1). This fact enables us to conduct the cointegration analysis. (Johansen, 1988). This technique suggests a maximum likelihood estimation procedure that provides two test statistics for determining the number of cointegrating vectors that could exist among a set of variables.

The trended case, with a trend in DGP, which has higher critical values, was considered in this analysis (Wickens, 1996). The first step is to specify a lag length for the VAR, which, on the basis of the likelihood ratio test, was set at four periods. Table 2 give the cointegration results for the long-term relationship between Australian trade with South Africa and Australia's total trade.

Table 2
Unit Root Tests of TotalAustralian Trade and Trade between Australia and South Africa

Variable	*ADF stat for log*	*ADF stat for Δlog*
Australian Total Trade (A_{TT})	-2.5859	-4.2969
Australian Trade with South Africa (A_{TSA})	-2.0511	-4.7145

Notes: 95% critical value for the augmented Dickey-Fuller statistic = -3.4576 for the log values and = -3.4581 for "log values

The second question is: did the two variables drift apart because Australian trade with South Africa grow faster than Australia total trade? A number of regression models have been run to answer the question. Comparing the (constant proportional) rate of growth of both Australia trade with South Africa (A_{TSA}) and Australia total trade (A_{TT}) may throw some light on the behavior of the two variables over time. These growth rates may be calculated using the regression models:

$$\text{Ln } (A_{TT})_t = \alpha + g_1 t + \mu_{1t} \quad (1)$$

$$\text{Ln } (A_{TSA})_t = \alpha + g_2 t + \mu_{2t} \quad (2)$$

Where, g_1 and g_2 represent the proportional (constant) rate of growth. If Australian trade with South Africa grows faster than Australian total trade, we would expect : $g_1 < g_2$.

The behavior of the share of Australian trade with South Africa to total Australian trade over time may also give an indication as to whether Australian trade with South Africa grows faster than total Australian trade. This behavior can be tested using the regression model:

$$(A_{TSA} / A_{TT})_t = \alpha + h t + \mu_{3t} \quad (3)$$

If the coefficient "h" is positive and statistically significant, this would indicate that Australian trade with South Africa grows faster than Australia's total trade. Table 4 gives the regression results. These results are based on quarterly data for the period 1980 (Q1) to 2004 (Q3). The regression results would seem to suggest that Australian trade with South Africa grew at a constant proportional rate of approximately 2.44 per cent per quarter while Australian total trade grew at a rate of only 1.55 per cent per quarter during the period

Table 3
Results of Cointegration Analysis for Australia Total Trade and Australia Trade with South Africa
Cointegration with unrestricted intercepts and restricted trends in the VAR

1. Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

95 observations from 1981Q1 to 2003Q4. Order of VAR = 4.

List of variables included in the cointegrating vector:

A_{TT} A_{TSA} Trend

List of eigenvalues in descending order:

.078448 .035599 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	7.7611	19.2200	17.1800
r<= 1	r = 2	3.4436	12.3900	10.5500

2. Cointegration LR Test Based on Trace of the Stochastic Matrix

95 observations from 1981Q1 to 2003Q4. Order of VAR = 4.

List of variables included in the cointegrating vector:

A_{TT} A_{TSA} Trend

List of eigenvalues in descending order:

.078448 .035599 0.00

Null	Alternative	Statistic	95% Critical Value	90% Critical Value
r = 0	r = 1	11.2047	25.7700	23.0800
r<= 1	r = 2	3.4436	12.3900	10.5500

1980-2004. The rate of growth of Australian trade with South Africa during this period is equivalent to the rate of growth of Australian trade with Malaysia but much higher than the rate of growth of Australian trade with Thailand (1.47 %); UAE (1.66 %) and Singapore (2.04 %). Australia has recently entered or is currently in negotiations of FTAs with all these countries. The share of Australian trade with South Africa relative to total Australia trade has been increasing over time since 1980. The regression results suggest that this share increased by approximately 0.056 per cent per quarter during the period 1980-2004.

Table 4
Regression Results of Relationship between AustralianTrade with South Africa (A_{TSA}) and Australian Total Trade (A_{TT})

(1) $\text{Ln}\,(A_{TT})_t = 9.1883 + 0.0155\ t$
(420.7) (40.9)
$R^{-2} = 0.945$ F= 1676.9 DW= 1.466

(2) $\text{Ln}\,(A_{TSA})_t = 3.5436 + 0.0244\ t$
(37.8) (14.9)
$R^{-2} = 0.695$ F= 224.5 DW= 1.472

(3) $(A_{TSA} / A_{TT})_t = 0.00333 + 0.000564\ t$
(7.0537) (6.8547)
$R^{-2} = 0.321$ F= 47.4 DW= 1.511

V. TRADE INTERACTION BETWEEN AUSTRALIA AND SOUTH AFRICA

Australia's trade with South Africa as a proportion of total Australian trade is quite small but has increased substantially during the period 1980-2004. However, any study of bilateral trade relationships must take into consideration the interaction between the Australian economy and the rest of the world. This interaction can be explained by the impact of economic growth on foreign trade. The growth in the Australian economy results in an increase in its imports from various trade partners. As the exports of the trade partner increases, its income rises. The rise in income of the trading partners would in turn stimulate their demand for imports from various countries that may include Australia. It follows from the above that the trade relationship between Australia and its major trading partners should be examined by a simultaneous-equations model to capture these feedback effects. The aim of this section is to test for feedback effects in Australia's trade relationship with South Africa.

The following simultaneous relationships, known as structural equations, have been developed to test for feedback effects in the trade relationship between Australia and South Africa.

Structural Equations

$$U_{A,t} = \alpha_0 + \alpha_1 X_{A\text{-}SA,t} + \alpha_2 X_{A\text{-}O,t} + \alpha_3 Y_{A,t-1} + e_{1t} \quad (4)$$

$$X_{A\text{-}SA,t} = \beta_0 + \beta_1 Y_{SA,t} + \beta_2 M_{A\text{-}SA,t} + \beta_3 M_{A\text{-}SA,t-1} + e_{2t} \quad (5)$$

$$M_{A\text{-}SA,t} = \gamma_0 + \gamma_1 Y_{A,t} + \gamma_2 P_{r,t} + \gamma_3 M_{A\text{-}SA,t-1} + e_{3t} \quad (6)$$

Endogenous Variables

$U_{A,t}$ = GDP of Australia in period t

$X_{A\text{-}SA,t}$ = Exports of Australia to South Africa in period t

$M_{A\text{-}SA,,t}$ = Imports of Australia from South Africa in period t

Predetermined Variables

$X_{A\text{-}O,t}$ = Australian exports to countries other than South Africa in period t

$Y_{A,t-1}$ = GDP of Australia in period t-1

$Y_{SA,t}$ = GDP of South Africa in period t

$P_{r,t}$ = South African export prices relative to those of industrialized countries in period t

$M_{A\text{-}SA,t-1}$ = Imports of Australia from South Africa in period (t-1)

Equation (4) tests the relationship between Australian income and its exports to South Africa as well as to the rest of the world. It is assumed that Australian income depends on its exports. It is also assumed that there is a partial adjustment mechanism in the income-export relationship.

Equation (5) examines the relationship between Australian exports to South Africa and the level of South African GDP. It is expected that the growth in the South African economy, i.e. an increase in the GDP of South Africa, would result in an increase in its imports from various trading partners. The lagged dependent variable gives the equation a dynamic character, allowing for partial adjustment or lagged effects following a Koyck geometrically

declining weight scheme. If there is a significant feedback effect, we would expect the coefficients β_2 and β_3 to be statistically significant. It is only then that we would be able to say that increasing imports from South Africa results, through the increase in the purchasing power of the South African economy, in stimulating South African imports, including those from Australia.

Equation (6) examines the relationship between Australian imports from South Africa and the Australian GDP within a process of a partial adjustment mechanism. Australia's imports from South Africa are assumed to depend on Australian income as well as South African export prices relative to those of industrialized countries, which are the major suppliers of Australian imports.

The above system is mathematically complete in that it contains as many equations as it has endogenous variables. Applying the order and rank conditions of identification to the simultaneous equations model, it can easily be verified that both conditions hold and each equation is *overidentified*. Hence the method of Two Stage Least Squares (2SLS) is appropriate to estimate the equations of the model.

The 2SLS results for the three equations of the model are presented in Table 5. The equations were also estimated by Ordinary Least Squares (OLS) as a sensitivity analysis[1]; these results are presented in Table 6. Overall the OLS results strongly support the 2SLS results. However, the 2SLS results are better than those given by OLS which suggests the presence of simultaneous bias. The data used for the estimations are for the period 1980 to 2003. The data is obtained from the IMF International Financial Statistics and Direction of Trade Statistics Yearbooks.

The residuals from regressions in each equation are I(0) or stationary.

The (adjusted) R^2 and F statistics of the fitted equations suggest that the model is a good fit. Also the estimated Durbin Watson (DW) and Durbin's h statistic support the view that the residuals about the fitted equations were independent (Kamenta 1990).[2]

Table 5
Regression Results of Trade Relationship between Australia and South Africa
Two–Stage Least Squares Estimation

$U_{A,t}$ = $70.5882 + 49.6752\ X_{A\text{-}SA,t} + 1.1897\ X_{A\text{-}0,t} + 0.7183\ Y_{A,t\text{-}1}$
(4.154) (2.511)** (2.997)*** (10.127)***

'R^2= 0.993; F = 1025.4***; n = 24; Durbin's h = 0.413

$X_{A\text{-}SA,t}$ = $-95.4217 + 0.000244\ Y_{SA,t} + 0.662\ M_{A\text{-}SA,t} + 07224\ M_{A\text{-}SA,t\text{-}1}$
(-3.001) (3.435)*** (4.377)*** (3.435)***

R^2 = .961 ; F = 165.9***; n = 24; DW = 1.537

$M_{A\text{-}SA,,t}$ = $81.4767 + 0.000879\ U_{A,t} - 3.8549\ P_{r,t} + 0.6574\ M_{A\text{-}SA,t\text{-}1}$
(0.504) (2.988)*** (-2.489)** (3.122)***

R^2 = .884; F = 50.3***; n = 24; Durbin's h = .411

Table 6
Regression Results of Trade Relationship between Australia and South Africa
Ordinary Least Squares Estimation

$U_{A,t}$ = $60.392 + 31.0846\ X_{A\text{-}SA,t} + 1.2779\ X_{A\text{-}0,t} + 0.7276\ Y_{A,t\text{-}1}$
(15.772) (1.824)* (3.333)*** (11.083)***

R^2= .993; F = 1027.6***; n = 24; Durbin's h = .455

$X_{A\text{-}SA,t}$ = $-100.6 + 0.000262\ Y_{SA,t} + 0.7692\ M_{A\text{-}SA,t} + .5886\ M_{A\text{-}SA,t\text{-}1}$
(-3.087) (3.547)*** (4.487)*** (2.581)**

R^2 = .956; F = 145.8.9**; n = 24; DW = 1.336

$M_{A\text{-}SA,,t}$ = $78.780 + 0.000895\ Y_{,t} - 3.8789\ P_{r,t} + 0.6482\ M_{A\text{-}SA,t\text{-}1}$
(0.448) (2.864)** (-2.406)** (3.102)**

R^2 = 0.883; F = 50.328. n = 24; Durbin's h = 0.534

Notes to Tables 5 and 6:
(1) n represents the number of observations used.
(2) Figures in parenthesis are t values.
(3) *denotes significant at the 10 per cent level.
(4) **denotes significant at the 5 per cent level.
(5) ***denotes significant at, at least, the 1 per cent level.

The simultaneous equations regression results suggest that:

1. Australian income is influenced by Australian exports to South Africa and to the rest of the world. The "t" value of the coefficient of the variable "$X_{A\text{-}SA,t}$", which represents Australia's exports to the South Africa, is significant at the 5 per cent level. The short-run elasticity of Australia's income with respect to Australia's exports to South Africa is approximately 0.037, while the long-term elasticity is approximately 0.132. This suggests that an increase in Australian exports to South Africa by 10 per cent results in an increase in Australia's income by approximately 0.4 per cent in the short run and by 1.3 per cent in the long run.
2. Australian exports to South Africa are significantly influenced by the level of South African GDP. A rise in South African real income by one million rand (R) results in an increase in Australia's exports to South Africa by approximately R244.
3. Australian exports to South Africa are significantly influenced by the level of South African GDP. A rise in South African real income by one million rand (R) results in an increase in Australia's exports to South Africa by approximately R244.
4. There is a significant feedback effect in the trade relationship between Australia and South Africa. The coefficients of the variables $M_{A\text{-}SA\ t}$ *and* $M_{A\text{-}SA,t\text{-}1}$, which represent Australia's imports from South Africa in period t and period t-1, in the second equation are positive and statistically significant, suggesting that Australia's spending on imports from South Africa promotes growth in Australia's exports to that country. Thus, as Australia imports more manufactures from South Africa, it stimulates a demand for imports of Australian metals in South Africa, to be used in the production of these manufactures.

5. Australian exports to South Africa are significantly influenced by the level of South African GDP. A rise in South African real income by one million rand (R) results in an increase in Australia's exports to South Africa by approximately R244.
6. There is a significant feedback effect in the trade relationship between Australia and South Africa. The coefficients of the variables $M_{A\text{-}SA\ t}$ *and* $M_{A\text{-}SA,t\text{-}1}$, which represent Australia's imports from South Africa in period t and period t-1, in the second equation are positive and statistically significant, suggesting that Australia's spending on imports from South Africa promotes growth in Australia's exports to that country. Thus, as Australia imports more manufactures from South Africa, it stimulates a demand for imports of Australian metals in South Africa, to be used in the production of these manufactures.
7. The regression results also suggest that Australian imports from South Africa are positively related to the Australian GDP within a partial adjustment mechanism. The marginal propensity of Australian imports from the South Africa is approximately 0.0008 in the short-run and 0.0026 in the long-run. This suggests that an increase in Australian real income by one million dollars results in an increase in Australian imports from South Africa by approximately A$879 in the short-run and by approximately A$2565 in the long-run.
8. The value of the coefficient of the variable $M_{A\text{-}SA,t\text{-}1}$ (0.6574) suggests that approximately 0.345 of the gap between the desired level of spending on imports from South Africa and the actual level of spending will be closed in one period and the number of periods of adjustment is approximately 3 years.
9. The coefficient of the variable $P_{r,t}$ which represents South African export prices relative to those of industrialized countries who are major suppliers of Australian imports, is negative and statistically significant. This suggests that the shift in Australian demand away from South African imports may be partially due to relatively higher South African export prices or due to the appreciation of the exchange rate which favors South Africa.

VI CONCLUSIONS

There has been a significant growth in the trade between Australia and South Africa. This trade was less than 270 million US dollars in 1980 and exceeded 1684 million US dollars in the year 2003. Approximately 2.2 per cent of total South African exports in 2003 were directed towards Australia and South Africa imported almost 2.5 per cent of its total imports from Australia in the same year. Australian trade with South Africa is approximately 1.05 per cent of total Australian trade. Australian exports to South Africa as a proportion of total Australian exports and Australian imports from South Africa as a proportion of total Australian imports have increased since 1980, and continues to increase. Thus, while the total value of trade between Australia and South Africa is still relatively small, this trade has been growing faster than total Australian trade and faster than Australia's trade with other countries with which it is currently negotiating special relationships.

The results from the system of equations discussed in Section five suggest that the Australian income is significantly influenced by Australian exports to South Africa and to the rest of the world. Australian exports to South Africa are significantly influenced by the growth in South African real income. The regression results also indicate that there are very significant feedback effects in Australia's trade with South Africa. Positive feedback effects

are not regularly found in trade analyses as discussed in the earlier literature review. However, here it was found that Australian exports to South Africa are strongly influenced by Australian imports from South Africa. An increase in Australian imports from South Africa results in an increase in South African income. This in turn leads to an increase in South African imports, including those from Australia. The regression results also suggest that Australian imports from South Africa are positively related to Australian real GDP within a partial adjustment mechanism. From the analysis of the composition of trade, these feedback effects likely occur as Australia exports minerals and metals to South Africa (particularly alumina), which are used in the manufacture of passenger motor vehicles, machinery and equipment, etc. that form the bulk of South African exports to Australia. The growth of this trade is fuelled by rising incomes in Australia, caused by rising exports, and channelled into increased demand for manufactured imports. One factor that appears to be retarding this growth in bilateral trade was identified in the regression model. South African export prices, relative to those of other industrialized countries who are major suppliers of Australian imports, seem to have a significant negative impact on Australia's imports from South Africa.

The objective of this paper was to assess whether there was enough strength within the existing trade relationship between Australia and South Africa to justify negotiating a special trade relationship, possibly involving a free trade agreement between the two countries. Current developments in the world commercial environment indicate that there has been an increasing trend towards negotiating preferential trade agreements at both the bilateral and regional level. Smaller, economically remote countries such as Australia and South Africa are in danger of being left out of these developments and hence need to actively seek out trading partners.

The results from this analysis indicate that trade between Australia and South Africa is growing significantly at well above the rate of growth of overall trade. Further, significant feedback effects were found, identifying that this growth is self-reinforcing and producing favourable income effects in both countries. While trade volumes are still small, they have increased substantially in the past two decades. All these findings support the argument that there is potential to improve trade between the two countries in the future and that a closer relationship should be considered. Trade between South Africa and Australia has been significantly influenced by reductions in Australian tariffs on manufactured products. This indicates that a trading relationship between the two countries that eliminated such tariffs would be particularly beneficial to South African producers of manufactured products.

There was some evidence that rising export prices in South Africa were negatively impacting on Australian imports. A free trade agreement between the two countries may help offset this problem by making South African manufactured imports cheaper on the Australian market. However, this may occur at the expense of more efficient imports from the rest of the world, causing a negative economic welfare effect. This finding highlights the need for South Africa to control the increase in its export prices if it is to remain competitive in global markets in both multinational and bilateral relationships.

Notes

1. This is because the properties of the sampling distributions of 2SLS estimates in small samples are unknown; OLS produces biased estimates but which nevertheless have finite sampling distributions (Kmenta 1990). Both sets of estimations were performed with the Shazam program.

2. In the light of the comments in footnote 1, the values of R^2, t, F, DW and Durbin's h statistics in Tables 2 and 3 are given for what they are worth. In addition to the test for serial correlation, inspection of the residuals about the fitted equations did not suggest any obvious violations of the homoscedasticity of error terms assumption. The equations were also analysed for multicollinearity and these tests gave no undue cause for concern; this is further confirmed by a comparison of the t statistics with the F statistics of the fitted equations. For further discussion, including the robustness of Least Squares methods in the presence of minor violations of the error term assumptions, see Griffiths et al., 1993.

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