

The implications of OECD growth for South African exports

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**Preliminary
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Abstract

Given the significance of the OECD as South Africa's main trading partner, the primary purpose of this paper is to analyse the role of OECD growth on exports. The estimation method accounts for non-stationarity in the data by estimating a vector error correction model. Although in the long-run both OECD growth and the real effective exchange rate were found to influence South Africa's export performance, OECD growth was found to have a far greater impact on exports. Conversely, in the short-run, the real effective exchange rate was found to be an important driver of export growth. One policy implication of this result is that policymakers should prioritise securing better and improved market access for SA goods into the OECD countries.

JEL classification: F1. F14. F41. F42

Keywords: trade, exchange rate, exports, imports

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1 Introduction

Following the various structural reforms implemented in South Africa during the 1990s (Calitz, 2002), South Africa has become increasingly globalized and exposed to international trade (Blignaut and Rangasamy, 2005). Total exports of goods and services in South Africa increased from R72,2 billion in 1990 to R517,4² billion in 2006, whilst exports of goods and services as a percentage of GDP increased from 24,2 per cent to 29,9³ per cent over the same period (South African Reserve Bank, 2007). This paper examines the role of foreign demand and relative prices as determinants of export growth. As a significant proportion of South African exports are destined for markets in the OECD countries, a relevant issue in this regard – which is the primary focus of the paper – relates to the implications of OECD growth for South African exports.

The next section briefly outlines the nature and extent of trade flows to the OECD. Section 3 analyses the implications of OECD growth for SA exports. Some theoretical considerations are highlighted in section 4. A brief description of the data used in this study is provided in section 5. The methodology employed in this study as well as the results of the study are highlighted in section 6. Section 7 proceeds with a brief probit analysis and some policy implications and conclusions are drawn in the last section.

² At market prices

³ GDP at market prices

2 The nature and extent of trade flows to the OECD

2.1 Aggregate trade flows

South Africa's major trading partners in terms of merchandise exports and imports for the period 1992 to 2005 are reflected in Table 1 and Table 2. Inter alia, there are three points that emerge from these tables;

- Firstly, South Africa's trading relations are highly concentrated. Twenty countries account for over two thirds of South Africa's imports. The same twenty countries accounted for more than three quarters of South Africa's exports.
- Secondly, during the 1990's South Africa's export destinations became more concentrated while there was some diversification as far as import sources are concerned.⁴
- Finally, the importance of the OECD as a trading partner is without question. In 2005, the OECD countries accounted for around 65 per cent (59 per cent) of South Africa's exports (imports).

Table 1 provides a listing of the major export destinations since 1992. The countries have been ranked according to their share of exports in 2005. South Africa's top twenty export destinations do not change much during the period under analysis. Since 1999, the countries listed in Table 1 were consistently ranked amongst South

⁴ For example, the top 20 export destinations accounted for around 79 per cent of total exports in 2005 as compared to around 57 per cent in 1992. As far as imports are concerned, 20 countries accounted for around 67 per cent of South Africa's imports in 2005, significantly down from the 81 per cent in 1992.

Africa's top twenty trading partners⁵. The vast majority of countries were also important trading partners prior to 1999⁶.

Japan, the United Kingdom and the United States are South Africa's dominant export partners, accounting for approximately 32 per cent of merchandise exports in 2003, 2004 and 2005. Other major export destinations include the G7 countries (with the exception of Canada), China, Japan, and various other East Asian economies. It is evident from Table 2 that the OECD has become an increasingly significant trading partner. The OECD share of exports has increased from 46 per cent in 1992 to 65 per cent in 2006. Since 2002, the OECD has accounted for approximately 65 per cent of South Africa's merchandise exports. In fact, around 82 per cent of exports to the top 20 export destinations are accounted for by OECD countries.⁷

⁵ With the exception of Hong Kong which was ranked number twenty-one in 2002

⁶ China was not ranked amongst South Africa's top twenty for the period 1993 to 1998. During this period, however, China appeared among South Africa's top thirty export destinations. In addition, from 1992 to 1996, India was not ranked amongst South Africa's top twenty. However, India was ranked twenty-two in 1995 and 1996. Prior to that, India was ranked among South Africa's top thirty-five export destinations. Finally, in 1992 and 1993, Australia was ranked twenty-one and twenty-two, respectively.

⁷ Prior to 2000, the OECD has accounted for over 75 per cent of exports to South Africa's top twenty trading partners.

Table 1 Trading partner share of exports

	1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		2004		2005	
	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent
Japan	4	5.5	4	5.8	4	6.1	3	6.3	2	7.4	2	7.3	3	6.9	4	6.8	3	8.0	3	7.7	3	9.3	2	10.2	3	10.2	1	11.0
UK	3	6.5	3	6.3	2	7.1	1	8.5	3	6.8	3	7.1	2	7.7	2	9.3	2	9.0	2	9.6	2	10.3	3	10.2	2	10.7	2	10.8
US	2	7.0	2	7.2	1	7.5	2	7.5	1	8.3	1	8.4	1	10.4	1	10.2	1	12.2	1	12.2	1	13.5	1	12.2	1	11.5	3	10.5
Germany	5	4.3	5	4.1	5	4.7	4	5.5	4	4.8	4	5.0	4	6.4	3	8.0	4	7.8	4	7.7	4	8.3	4	7.6	4	7.8	4	7.0
Netherlands	8	2.8	8	2.9	8	2.4	8	2.9	7	2.9	6	3.2	5	4.3	5	3.7	5	3.3	5	3.8	5	4.7	5	4.8	5	4.6	5	5.0
Australia	19	0.5	19	0.7	18	0.8	16	1.4	16	1.5	18	1.3	16	1.4	15	1.6	15	1.7	18	1.5	16	1.9	12	2.4	10	2.8	6	3.2
Belgium	7	2.9	6	3.1	6	2.9	7	3.1	6	3.1	9	2.7	7	3.1	6	3.3	6	3.1	6	2.7	6	3.5	6	3.1	9	2.8	7	3.0
China	18	0.8	18	0.9	19	0.6	19	0.9	20	0.7	20	0.7	20	0.6	20	1.0	19	1.1	17	1.5	18	1.8	8	2.8	12	2.5	8	2.9
Spain	13	1.6	16	1.4	14	1.4	14	1.6	14	1.6	17	1.4	12	1.8	13	1.9	17	1.7	12	1.8	10	2.4	10	2.6	11	2.7	9	2.9
Switzerland	1	7.8	1	10.6	3	6.9	6	4.1	13	1.8	14	1.6	13	1.8	19	1.2	14	1.7	14	1.6	12	2.1	11	2.4	8	2.8	10	2.6
Italy	10	2.4	12	1.9	10	2.0	10	2.4	10	2.3	10	2.1	8	2.8	8	2.6	7	2.8	7	2.7	7	3.1	7	2.9	7	3.0	11	2.5
Zimbabwe	9	2.4	9	2.5	7	2.8	5	4.2	5	4.3	5	4.0	6	3.7	7	3.1	9	2.3	9	2.2	8	2.7	9	2.8	13	2.4	12	2.5
India	20	0.0	20	0.1	20	0.5	20	0.7	19	0.9	19	1.0	19	1.1	17	1.4	18	1.4	19	1.3	19	1.5	19	1.4	19	1.4	13	2.5
France	15	1.4	17	1.1	17	1.2	17	1.3	18	1.4	15	1.4	10	2.0	12	1.9	12	1.9	11	1.9	9	2.6	14	2.2	14	2.1	14	2.2
Mozambique	17	1.3	13	1.9	11	2.0	13	1.8	12	2.0	11	2.0	11	1.8	10	2.5	8	2.4	8	2.3	11	2.4	13	2.4	15	2.0	15	2.1
Zambia	12	1.7	14	1.8	15	1.3	18	1.3	15	1.5	12	1.7	15	1.5	16	1.5	10	2.2	10	2.0	13	2.1	17	1.7	16	1.8	16	1.8
Korea	14	1.4	15	1.7	12	1.9	12	2.0	9	2.5	8	2.7	14	1.7	9	2.5	11	2.0	15	1.6	14	2.1	16	1.8	17	1.7	17	1.8
Taiwan	6	3.1	7	2.9	9	2.1	9	2.5	8	2.7	7	2.8	9	2.1	11	2.1	13	1.8	16	1.5	17	1.9	15	2.1	6	3.4	18	1.7
Israel	16	1.4	11	2.2	16	1.2	15	1.4	17	1.5	16	1.4	17	1.3	14	1.7	16	1.7	13	1.7	15	2.1	18	1.6	18	1.5	19	1.5
Hong Kong	11	2.2	10	2.3	13	1.7	11	2.0	11	2.3	13	1.6	18	1.3	18	1.4	20	1.1	20	1.1	20	1.3	20	1.4	20	1.3	20	1.3
Top 20		57.0		61.3		57.3		61.4		60.2		59.4		63.7		67.7		69.1		68.5		79.6		78.9		79.3		78.7
OECD		46.0		48.6		46.2		48.4		45.7		44.9		52.3		53.7		56.8		56.5		65.5		64.7		65.5		64.8

Source: Department of Trade and Industry

Note: 2002-2005 excludes ship stores and unallocated

Table 2 Trading partner share of imports

	1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		2004		2005	
	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent	Rank	Per cent
Japan	4	10.5	3	12.5	4	10.3	4	10.0	4	8.3	4	7.5	4	7.8	4	7.8	4	7.9	4	6.8	4	6.9	4	7.1	5	6.8	4	6.8
UK	3	11.1	4	11.2	2	12.0	3	11.1	3	11.6	3	11.3	3	9.9	3	9.6	3	8.6	3	8.5	3	9.1	3	8.7	4	6.9	5	5.7
US	2	15.1	2	13.3	3	11.8	2	12.0	2	12.9	2	12.5	2	13.6	2	13.7	2	11.8	2	12.0	2	11.6	2	9.7	2	8.5	3	7.8
Germany	1	16.7	1	15.6	1	17.1	1	16.8	1	15.2	1	13.7	1	14.4	1	14.7	1	13.3	1	15.0	1	15.7	1	14.9	1	14.2	1	14.0
Netherlands	9	2.5	8	2.4	9	2.5	9	2.3	9	2.6	8	2.6	9	2.6	10	2.3	11	1.9	10	1.9	10	1.8	10	1.7	12	1.5	13	1.5
Australia	14	1.3	14	1.2	13	1.4	12	1.7	10	2.5	9	2.5	11	2.4	11	2.2	8	2.5	8	2.8	8	2.8	8	2.4	8	2.4	9	2.1
Belgium	10	2.4	10	2.1	10	2.3	10	2.2	12	1.9	12	1.7	13	1.7	13	1.7	13	1.5	13	1.5	13	1.4	13	1.5	14	1.3	14	1.4
China	15	1.3	12	1.7	12	1.7	11	1.9	11	2.1	10	2.5	7	3.0	7	3.4	6	3.7	5	4.2	5	5.2	5	6.4	3	7.5	2	9.0
Spain	16	0.7	17	0.7	17	0.7	16	0.8	15	1.0	16	1.0	14	1.6	15	1.1	14	1.1	14	1.1	14	1.3	12	1.5	13	1.4	11	1.6
Switzerland	8	2.6	9	2.3	8	2.6	8	2.4	8	2.6	11	2.2	8	2.7	8	2.6	9	2.4	11	1.9	11	1.7	14	1.3	15	1.0	15	1.3
Italy	6	3.7	6	3.5	5	4.1	5	4.1	5	4.4	5	3.8	6	4.0	6	3.7	7	3.3	7	3.7	7	3.6	7	3.3	7	3.0	7	3.0
Zimbabwe	12	1.6	15	1.1	15	1.4	15	1.0	17	0.7	17	0.7	17	0.8	17	0.8	18	0.7	17	0.7	17	0.8	16	1.0	16	0.9	16	0.9
India	18	0.2	18	0.3	18	0.5	17	0.7	16	1.0	15	1.2	16	1.1	16	1.0	16	0.9	15	1.0	15	1.1	15	1.2	11	1.5	10	2.0
France	5	3.8	5	3.5	6	3.7	6	3.9	6	3.4	6	3.6	5	4.4	5	4.0	5	4.2	6	3.8	6	4.1	6	6.0	6	6.1	6	4.4
Mozambique	19	0.1	20	0.1	20	0.1	19	0.1	20	0.1	19	0.1	20	0.1	19	0.2	19	0.2	20	0.1	20	0.1	20	0.1	20	0.1	20	0.1
Zambia	20	0.1	19	0.1	19	0.1	20	0.1	19	0.2	20	0.1	19	0.2	20	0.2	20	0.2	19	0.2	19	0.3	19	0.2	19	0.3	19	0.4
Korea	13	1.5	13	1.5	14	1.4	14	1.5	13	1.6	13	1.6	12	1.9	12	1.9	12	1.9	12	1.8	12	1.6	11	1.6	9	2.1	8	2.6
Taiwan	7	3.6	7	3.5	7	3.4	7	3.3	7	3.1	7	2.8	10	2.5	9	2.5	10	2.3	9	2.1	9	2.0	9	1.8	10	1.6	12	1.6
Israel	17	0.6	16	0.9	16	0.8	18	0.6	18	0.7	18	0.6	18	0.7	18	0.7	17	0.8	18	0.5	18	0.5	18	0.5	18	0.5	18	0.5
Hong Kong	11	1.8	11	1.9	11	1.9	13	1.7	14	1.6	14	1.4	15	1.2	14	1.2	15	1.0	16	1.0	16	0.9	17	0.9	17	0.9	17	0.7
Top 20		81.4		79.3		79.7		78.2		77.4		73.6		76.6		75.2		70.2		70.5		72.6		71.8		68.6		67.3
OECD		73.6		71.6		73.5		72.5		71.3		68.4		72.3		70.4		66.4		66.5		67.2		65.4		61.7		59.2

Source: Department of Trade and Industry

Note: 2002-2005 excludes unallocated

2.2 Nature of exports to the OECD

Table 3 reflects the nature of exports to the OECD countries. The analysis pertains to the first eighteen sections of the Harmonized system classification. These sections accounted for over ninety-eight per cent of South Africa's total exports in 2004 and 2005. An abridged description of these eighteen sections is provided in table A1 in the annex.

South Africa's exports to the OECD are largely commodity-based. Exports to the OECD in 2005, for the first eighteen sections, amounted to approximately R148.2 billion. Of this, approximately R84.1 billion, or 56,8 per cent, was due to the export of precious metals and precious or semi-precious stone (section fourteen), mineral products (section five) and base metals (section fifteen). When live animals (section one), vegetable products (section 2) and wood (section 9) are included, the OECD share increases to R93.5 billion or 63,1 per cent of South African exports in 2005. In 1992, the share of these six sections of total OECD exports was 70,4 per cent. This share declined steadily for the next decade (although remaining above 50 per cent), reaching 51,9 per cent in 2002. Subsequently, their share of total OECD exports has been on the rise, increasing in 2003, 2004 and 2005 to 55,8, 62,6 and 63,1 per cent, respectively.

The numbers in parenthesis (in Table 3) which reflect the percentage of total merchandise exports per section exported to the OECD, indicate that a significant portion of South Africa's total commodity exports are destined for the OECD. With the exception of section three and section 9, the OECD receives a significant share of each section, in most cases over forty per cent. In 2005, 68,7 per cent of exports of

leather and leather articles (section eight) were exported to the OECD. The OECD also received more than half of South African exports of glass and stone (section thirteen), live animals (section one), vegetable products (section two) and mineral products (section 5). In addition, the OECD share of precious metals exports has increased significantly over the past few years, from 32 per cent in 2003 to 45 per cent in 2005.

Table 3 Nature of exports to the OECD, R millions, (per cent)

	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8	Section 9	Section 10
1992	386 (52.6)	1488 (66.9)	11 (7.0)	916 (36.0)	4113 (51.6)	1632 (50.8)	129 (17.5)	335 (80.4)	177 (47.1)	665 (41.1)
1993	461 (50.8)	1662 (69.4)	5 (3.1)	819 (33.0)	4170 (45.3)	1495 (44.6)	163 (22.4)	459 (82.9)	205 (32.6)	583 (32.7)
1994	651 (57.5)	1837 (44.1)	8 (5.1)	977 (29.1)	4213 (42.4)	2100 (43.9)	181 (20.5)	622 (80.9)	263 (34.7)	943 (35.8)
1995	658 (54.9)	2176 (59.6)	22 (10.5)	1076 (27.8)	5769 (45.2)	2627 (42.4)	332 (24.5)	693 (76.0)	199 (23.1)	2104 (46.1)
1996	542 (49.3)	2314 (45.5)	24 (9.5)	1667 (29.7)	6986 (44.5)	3405 (42.4)	434 (27.5)	833 (72.0)	223 (24.3)	1152 (30.9)
1997	623 (46.2)	2587 (51.8)	28 (11.2)	1805 (29.7)	7403 (40.2)	3841 (43.1)	561 (29.3)	883 (71.9)	249 (22.8)	1215 (34.8)
1998	1012 (53.0)	3413 (59.6)	27 (9.7)	2128 (31.1)	10012 (52.6)	3510 (38.1)	685 (32.6)	821 (71.1)	373 (26.5)	1533 (36.1)
1999	1196 (52.9)	3936 (60.7)	17 (6.0)	2333 (31.7)	10111 (47.0)	3899 (39.0)	874 (30.5)	685 (56.9)	603 (33.7)	1780 (37.5)
2000	1272 (52.8)	3771 (63.0)	31 (10.7)	3111 (34.8)	11841 (43.6)	5159 (40.9)	1005 (31.0)	1092 (67.7)	709 (31.5)	2535 (38.9)
2001	1894 (59.9)	4172 (56.5)	45 (14.3)	3639 (31.7)	17539 (48.3)	5560 (37.8)	1181 (28.6)	1089 (69.3)	708 (26.9)	2758 (39.8)
2002	2557 (58.3)	5425 (52.1)	83 (20.6)	5131 (36.6)	22837 (52.6)	8563 (43.1)	1854 (31.9)	1461 (73.9)	1214 (31.7)	3218 (41.1)
2003	2379 (62.6)	5565 (56.5)	54 (17.8)	4949 (39.0)	17684 (52.1)	6199 (39.6)	1687 (32.9)	937 (65.6)	1040 (30.5)	2446 (35.3)
2004	2055 (60.6)	6290 (63.3)	35 (14.9)	4897 (42.0)	18921 (54.7)	7057 (39.7)	1820 (34.2)	972 (70.7)	949 (29.0)	2283 (36.0)
2005	1882 (59.1)	6579 (55.0)	35 (13.6)	5371 (41.0)	24652 (52.0)	9532 (43.5)	2040 (34.1)	914 (68.7)	886 (25.0)	2339 (34.8)
	Section 11	Section 12	Section 13	Section 14	Section 15	Section 16	Section 17	Section 18	Total	
1992	931 (53.1)	30 (57.3)	168 (46.8)	6675 (26.3)	3743 (39.1)	912 (43.8)	1129 (48.6)	104 (60.1)	23545 (38.2)	
1993	901 (52.6)	38 (54.8)	174 (41.6)	10002 (39.8)	3811 (38.5)	1124 (42.1)	1409 (52.0)	126 (57.0)	27608 (42.5)	
1994	1023 (54.1)	58 (53.0)	208 (44.7)	9647 (28.9)	4602 (38.9)	1380 (42.1)	1439 (51.8)	160 (50.3)	30312 (36.7)	
1995	1269 (56.2)	68 (56.6)	228 (40.9)	8675 (29.0)	5590 (37.3)	2063 (38.0)	1699 (45.9)	221 (51.3)	35469 (38.1)	
1996	1294 (52.7)	80 (41.8)	265 (36.8)	5680 (18.7)	5704 (31.8)	2777 (43.0)	1823 (42.9)	277 (47.1)	35480 (33.4)	
1997	1505 (49.7)	70 (47.8)	338 (41.2)	5532 (17.1)	6250 (30.0)	3498 (42.3)	2817 (42.7)	437 (55.3)	39643 (32.9)	
1998	1946 (63.4)	65 (46.5)	452 (49.9)	6830 (20.4)	10635 (47.3)	4722 (47.6)	4765 (60.1)	420 (50.6)	53350 (40.8)	
1999	2198 (61.9)	93 (50.1)	551 (51.3)	9276 (26.4)	9651 (39.2)	6707 (55.7)	8523 (69.6)	454 (51.4)	62887 (42.4)	
2000	2489 (59.5)	76 (36.8)	631 (53.0)	11938 (28.4)	14386 (46.0)	9164 (57.6)	9885 (63.9)	447 (45.0)	79544 (43.6)	
2001	3343 (64.0)	104 (44.2)	756 (55.4)	13064 (27.9)	13301 (42.4)	14706 (63.8)	11566 (56.1)	581 (47.5)	96004 (43.9)	
2002	4892 (67.8)	159 (49.9)	1105 (58.8)	14755 (24.1)	15826 (37.4)	16452 (61.0)	14433 (55.6)	734 (47.6)	120698 (43.2)	
2003	4208 (68.6)	127 (46.3)	1003 (59.7)	18845 (31.8)	15223 (34.7)	13566 (57.9)	12272 (48.0)	633 (39.7)	108816 (42.7)	
2004	3294 (67.2)	101 (47.3)	1254 (64.8)	32769 (40.9)	21547 (37.6)	14811 (58.0)	12116 (46.4)	593 (40.2)	131764 (45.2)	
2005	2524 (57.0)	95 (43.7)	1403 (68.5)	37041 (44.9)	22426 (37.9)	17889 (61.8)	11808 (35.7)	783 (44.8)	148200 (45.3)	

Source: Department of Trade and Industry

3 The implications of OECD growth for South African exports

The early empirical work has shown that there is a strong relationship between economic growth and import growth in industrial countries. Goldstein and Khan (1982) note that the income elasticity of total import demand for industrial countries for the period 1968 to 1980 lies in the range of 1,25 to 2,25 per cent. Thus, a reduction in industrial country growth translates into a larger than proportionate decline in their import demand (Goldstein and Khan. 1982). More recent estimates, provided in Table 4, indicate that this is certainly still the case today. Implied income elasticity of imports⁸ of advanced economies for the period 1990-2006 range between 1,9 and 2,8 per cent for the last 5 years, indicating that foreign income remains a significant determinant of industrialised country import demand.

Table 4 Implied income elasticities for advanced country imports

(Average annual percentage changes)

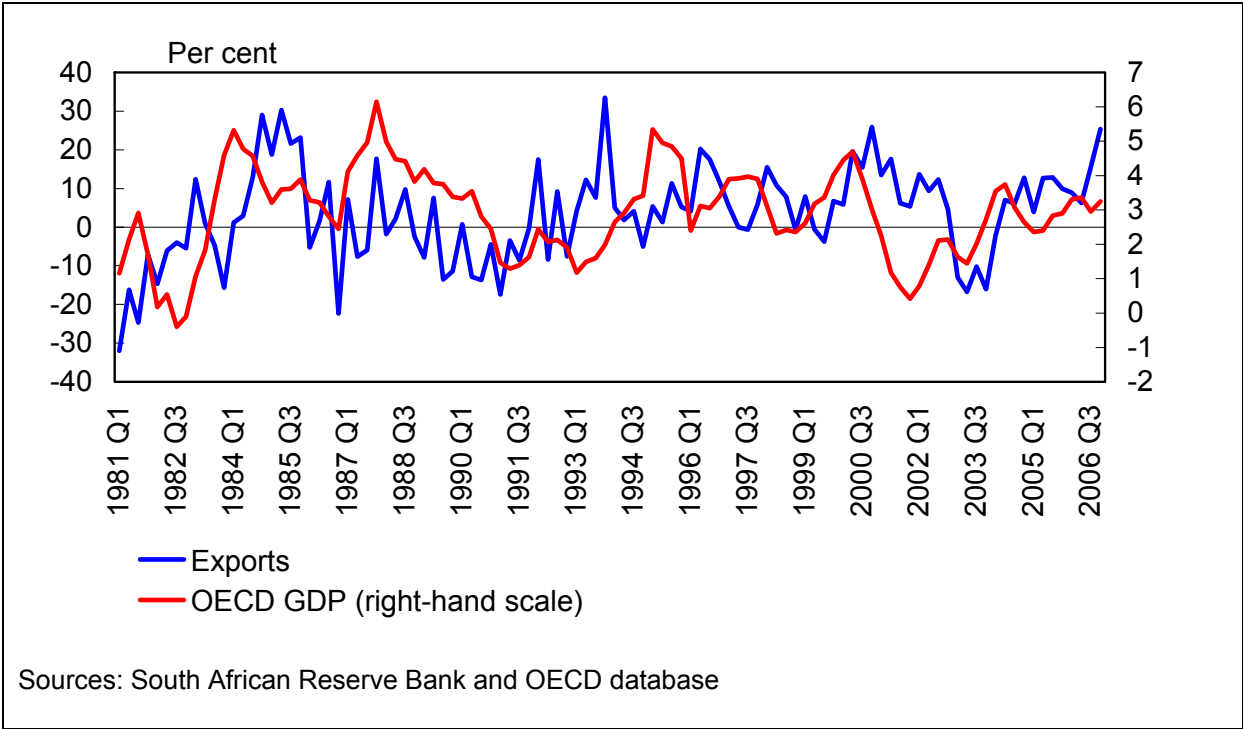
	Average 1990 -1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Real GDP	2.4	2.9	3.4	2.5	3.5	4.0	1.2	1.6	1.9	3.3	2.5	3.1
Volume of goods imports	6.1	6.0	10.0	6.0	8.2	12.3	-1.6	3.0	5.0	9.4	6.2	7.8
Implied income elasticity	2.6	2.1	2.9	2.4	2.3	3.1	-1.3	1.9	2.6	2.8	2.5	2.5

Source: IMF *World Economic Outlook* database (April 2007)

As pointed out in the preceding section, around 65 per cent of South Africa's total merchandise exports are currently destined for markets in the OECD countries. The information in Table 4 suggests that economic growth in OECD countries will have an impact on SA exports. In some regards this is reflected in Figure 1 which shows a strong correlation between overall OECD economic growth and SA export growth.

⁸ Ratio of import volumes to real GDP

Figure 1 OECD GDP and SA exports



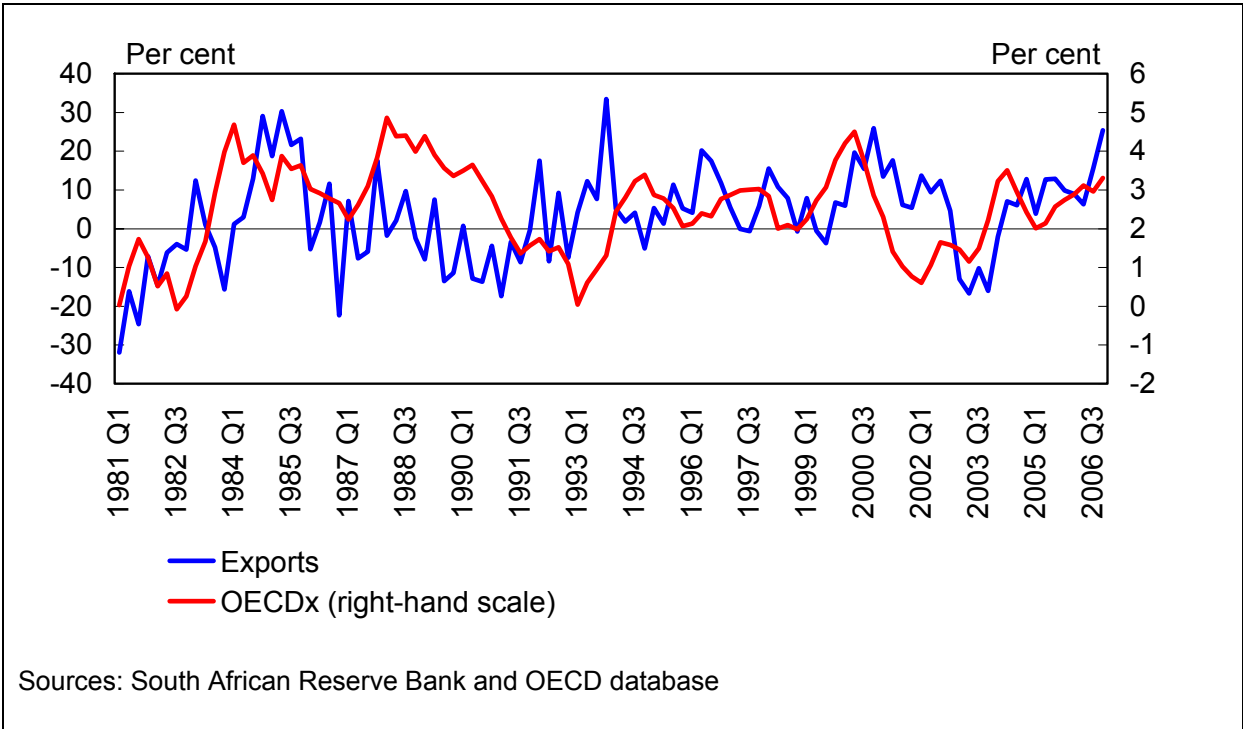
3.1 Export weighted OECD growth and SA exports

An export weighted growth rate of major trading partners can be a useful indicator of export demand (Smith, 2004). In our case this would entail an analysis of the relationship between the export weighted OECD growth rate (OECDx) on SA exports.⁹ Export weights were constructed using trade data obtained from the OECD database.¹⁰ The real GDP data used in the construction of (OECDx) were also obtained from the OECD database.¹¹

⁹ See Smith (2004) for a similar application to the New Zealand case.
¹⁰ Two year moving averages were used in the calculation of the trade weights in order to smooth any volatility in the data. Actual 2005 values were used to construct 2005 weights. The 2005 weights were used for 2005 and 2006.
¹¹ Where OECDX is the measure of foreign income or trading partner (OECD) demand. Following Smith (2004) OECDx is calculated as a Fisher Ideal Index.

Figure 2 shows the correlation between overall OECDx growth and SA export growth. Once again the correlation appears to be very strong which indicates a strong positive relationship between trading partner (OECD) activity and South African exports. However, as correlation does not imply causation, the remainder of the paper is devoted to analysing the relationship between trading partner (OECD) activity and SA exports in more detail.

Figure 2 OECDx growth and SA export growth



4 Some theoretical considerations

This paper uses a derivation of the n-country imperfect substitutes model described in Goldstein and Khan (1985) which has formed the basis of much of the empirical analysis in the economic literature.¹² Similar models can be found in Arize (1995), Arize and Osang (2000), Senhadji and Montenegro (1999) and Takaendesa et al (2006). As Fallon and de Silva (1994) note, exports should ideally be estimated as a function of both foreign demand and relative prices.

The long-run export demand function is depicted as follows:

$$X_t = \beta_0 + \beta_1 Y_t^f + \beta_2 P_t + \varepsilon \quad [1]$$

where X_t denotes export demand, Y_t^f is foreign income and P_t captures the relative price effect. The relative price effect is measured by the ratio of South Africa's export price relative to world export prices – which is indicative of South Africa's external competitiveness.

A positive relationship between foreign income and exports is expected. Conversely, if South Africa's export prices rise relative to world export prices, the demand for South African exports will decline, thus the coefficient β_2 should be negative. There are a broad range of variables which could be used as proxies for Y_t^f and P_t . These are discussed in some detail in section 5.

¹² The reader is referred to Goldstein and Khan (1985) for a detailed discussion of the imperfect substitutes model, specification and modelling issues as well as variable choice.

Unless supply is assumed to be perfectly price elastic, the estimation of a single-demand equation may result in a price elasticity measure that is biased downwards. A perfectly price elastic supply function is associated with an exogenous export price, enabling for the export demand function to be estimated using single-equation methods (Goldstein and Khan, 1985). In the case that export supply is not perfectly price elastic, however, the model should either be estimated simultaneously or converted into reduced-form equations (Goldstein and Khan, 1985). Goldstein and Khan (1985) briefly survey the empirical literature and note that the inclusion of an export supply function tends to increase the price elasticity of export demand (Goldstein and Khan, 1985). This issue is addressed more fully in the next section.

This paper accounts for non-stationarity prevalent in the data by using a vector error correction model (VECM).

5 Data description

South Africa's export demand function is estimated using quarterly data for the period 1990:1 to 2006:4. This sample period coincides with South Africa's re-entry into the global economy.

Merchandise exports including gold (XPPI) was used to represent export demand. The exports series was deflated by the PPI in order to transform the series into export volumes. The data was sourced from the Reserve Bank database.

Behar and Edwards (2004) outline the numerous difficulties associated with finding appropriate proxies for foreign and domestic prices when calculating the relative price variable. For example, when considering domestic prices, price indices of aggregated goods may be misleading as an increase in the export of higher-value goods will result in higher unit-values. In addition, a drawback of using the PPI, CPI and the GDP deflator is that these series contain tradable and non-tradable goods, although producer prices may be a better alternative than consumer prices. As far as foreign prices are concerned, these have been proxied by trading partners' export prices or trading partner sectoral producer prices in the empirical literature. In addition, the real effective exchange rate has also been used as a proxy for the relative price variable (Takaendesa et al, 2006, Tsikata (1999) and Fallon and de Silva (1994), Behar and Edwards, 2004). In this paper, various measures of foreign and domestic prices were considered.¹³

OECDx was constructed using the method outlined by Smith (2004) and described in the preceding section. The data used was sourced from the OECD database. OECDx has been calculated using seasonally adjusted real GDP data in US dollars at constant purchasing power parity rates for individual OECD countries, and is in index form.

However, in all cases, the relative price term was found to be statistically insignificant with the wrong sign. Fallon and de Silva (1994) and Todani and Munyama (2005)

¹³ Domestic price measures included: Export price index including gold, export price index excluding gold, PPI and an export deflator. On the other hand, foreign price measures included: Foreign WPI, the real effective exchange rate, US import price series and OECD trade weighted US import price series. The two import price series were calculated based on US import prices and South African exports to the OECD and to the rest of world. This entailed weighting US import price indexes with disaggregated South African export data (sourced from the Department of Trade and Industry).

also found the coefficients on relative prices to be statistically insignificant with the incorrect signs¹⁴. Following the convention of those authors mentioned above, the real effective exchange rate (REER) was used to capture all relative prices.¹⁵

As previously mentioned, the potential endogeneity prevalent in the single demand equation may lead to estimates that are biased. To address this issue, based on the approach of Takaendesa et al (2006), a weak exogeneity test was performed in order to establish which variables are endogenous. The test results are reflected in Table 5. The results indicate that REER is exogenous. Thus, by using the real effective exchange rate as a proxy for the relative price effect, the simultaneity prevalent between exports and prices has been avoided and in so doing, ensuring to some extent at least that the estimated coefficient of REER will not be biased. On the other hand, the exogeneity tests indicate that *OECDx* is endogenous. However, we follow the convention in the empirical literature where it is assumed that foreign demand (in our case *OECDx*) is exogenously determined.¹⁶

Table 5 Weak exogeneity test

	LR test statistic	p-value
XPPI weakly exogenous to vector	9,8752	0,0017
REER weakly exogenous to vector	1,6163	0,2036
OECDx weakly exogenous to vector	11,2081	0,0008

¹⁴ Fallon and de Silva (1994) used export prices relative to the domestic price of manufactured products, while Todani and Munyama (2005) used the log of the rand/dollar exchange rate multiplied by the ratio of foreign inflation to domestic inflation.

¹⁵ The real effective exchange rate was sourced from the Reserve Bank database.

¹⁶ However, it should be noted that since *OECDx* has been found to be endogenous, the estimated coefficient on *OECDx* may be biased downwards (Orcutt 1950).

6 Methodology and results

The multivariate cointegration method was used to estimate the long-run relationship amongst the variables listed in equation 1. The Augmented Dickey Fuller test indicated that all variables were found to be integrated of order one and first difference stationary. The results of the ADF test are presented in Table 6.

Table 6 Unit root tests

Variable	Level [lags]		First Difference [lags]	
	Intercept	Intercept and trend	Intercept	Intercept and trend
XPPI	0,4022[1]	-4,3029***[0]	-5,6362*** [2]	-5,7064***[2]
REER	-1,5989 [0]	-1,9966 [0]	-7,2449***[0]	-7,1877***[0]
OECDx	0,8942 [1]	-2,6219[1]	-4,7493***[0]	-4,8776***[0]

Notes:

- 1 *** denotes significance at the 1 per cent level
2. The lag order was selected from a maximum order of 10 lags using the Akaike information criterion

Table 7 presents the results for the cointegration tests, conducted on the basis of a VAR with 2 lags (selected by the Akaike Information Criterion from a maximum lag order of 6) and an unrestricted constant term.¹⁷ Both the Johansen trace and maximal eigenvalue tests indicate that there is 1 cointegrating vector at the 10 per cent level. Thus, we assume the presence of one cointegrating vector in our estimation.

¹⁷ The LR, FPE and HQ also identified the optimal lag length as two quarters.

Table 7 **Johansen cointegration test**

Null	Trace statistic	Maximal eigenvalue statistic
r=0	28,5507**(29,7971)	20,0494**(21,1316)
r≤1	8,5013 (15,4947)	8,1521 (14,2646)
r≤2	0,3492 (3,8415)	0,3492 (3,8415)

Notes:

- 1 ** denotes significance at the 10 per cent level
2. Critical values in parenthesis

As all variables are in logarithm form, the coefficients represent elasticity measures. Normalising on the export variable, the long-run dynamics are presented in Table 8. The real effective exchange rate (REER) and export demand (OECDx) are significant with the expected signs. A 1 percent increase in the real effective exchange rate (i.e. as South African goods become less competitive) results in a 0.3 per cent decline in real exports in the long run. On the other hand, a 1 per cent increase in OECDx real GDP results in a far greater 2.5 per cent increase in exports. These results indicate that in the long-run OECD demand exerts a far greater influence on South African export growth than does real effective exchange rate changes. These estimates are in line with those found in other studies (Behar and Edwards, 2004; Arize et al, 2000; and Arize, 1995). Riedel (1998) notes that for both developed and developing economies, most income elasticity estimates derived from export-demand equations range between 2 to 4 per cent.¹⁸

¹⁸ The reader is also referred to a review by Marquez and McNeilly (1988, in Arize et al, 2000)

Table 8: Long-run dynamics

Variable	Estimated coefficient	t-statistic
Constant	1,1098	
REER	-0,2683	2,2927
OECDx	2,5449	-20,2569

Since a valid long-run relationship exists amongst the variables, it is possible to analyse the direction of both long-run and short-run granger causality effects. The results are shown in Table 9. The coefficient of the error correction term (ECT) indicates what proportion of deviations in actual exports is adjusted in each quarter while the coefficients on the lagged values of the differenced terms depict the short-run dynamics. The coefficient of the ECT in the real export equation (XPPI) is significant at the 1 per cent level while it is insignificant for the real effective exchange rate (REER) and foreign demand (OECDx) equations. This implies only real exports adjust to any long run disequilibrium while no such adjustments occur for the REER and OECDx. In other words, the real effective exchange rate combined with OECDx growth *Granger-cause* real exports in the long-run. The statistically significant error correction term confirms our assumption that the variables are cointegrated and indicates that approximately 64 per cent of deviations in exports adjusts back towards equilibrium in the current quarter. This result is comparable to Takaendesa et al (2006), who estimated a similar model over a comparable time period, and found an adjustment speed of 66 per cent. However, Behar and Edwards (2006), who use quarterly data for a longer period (1975-2000), find a smaller adjustment coefficient of between -0.03 to -0.17. As the ECT is not significant in both the real effective exchange rate and OECD growth equations, there is no evidence of long-run causal effects running from exports and foreign demand (OECDx) to the real

effective exchange rate or from exports and the real effective exchange rate to foreign demand (OECDx). However, in the short-run, changes in the real effective exchange rate *Granger-cause* real export growth, since the lagged coefficient of $\Delta REER$ is significant at the 1 per cent level. However, changes in OECDx do not *Granger-cause* real exports in the short-run.

Thus, the results of Table 9 indicate that there is *uni-directional* causality running from foreign demand (OECDx) and the real exchange rate (REER) to real exports (XPPI) in the long-run and from the real exchange rate (REER) to real exports (XPPI) in the short-run. In addition, the magnitude of the OECDx coefficient relative to the coefficient of the real effective exchange rate suggests that a change in OECDx (i.e. foreign demand) is the primary driver of export growth in the long-run.

Table 9: Error correction modelling and short-run dynamics

Dependent Variable	Coefficients of lagged $\Delta XPPI$	Coefficients of lagged $\Delta REER$	Coefficients of lagged $\Delta OECDx$	ECT
$\Delta XPPI$	-	S (0,0021)	NS (0,8766)	-0,6372***
$\Delta REER$	NS (0,9529)	-	NS (0,2275)	0,0621
$\Delta OECD$	NS (0,4852)	NS (0,5013)	-	-0,0067

Note: ***, ** and * denotes significance at the 1 per cent, 5 per cent and 10 per cent level, respectively

Thus, a significant long-run relationship has been found between a trade-weighted OECDx and South Africa's merchandise exports. Given the high positive correlation between real exports and the overall OECD growth as reflected in Figure 1, it is also useful to examine the effect of real GDP growth in the OECD on domestic exports.

Thus, the same analysis was conducted replacing the trade-weighted OECDx with OECD_{TOT}, the log of real GDP for the OECD.

The Augmented Dickey Fuller test indicated that OECDx_{TOT} was integrated of order one and first difference stationary. A Johansen cointegration test was estimated on the basis of a VAR with 2 lags (selected by the Akaike Information Criterion from a maximum lag order of 6) and an unrestricted constant term¹⁹. Both the trace and maximal eigenvalue tests indicate 1 cointegrating vector at the 5 per cent level of significance, respectively.

The long-run dynamics are presented in Table 10. The coefficient of the real effective exchange rate has the correct sign but is insignificant. However, the coefficient of OECD_{TOT} is significant and the results show that a 1 per cent increase in the real GDP of OECD_{TOT} results in a 2,2 per cent increase in exports. This result is very similar – although the coefficient is slightly smaller- than the long-run estimates presented in Table 8. In some respects this is not surprising, given the fact that a trade weighted foreign demand variable (OECDx) should be more closely related to real exports trends.

Table 10: Long-run dynamics

Variable	Estimated coefficient	t-statistic
Constant	2,3564	
REER	-0.1427	1,2148
OECD _{TOT}	2,1544	-21,2290

The results of the long-run and the short-run granger causality tests are shown in Table 11. The coefficient of the ECT in the real export equation is significant at the 1 per cent. This implies that, once again, the real effective exchange rate combined with OECD growth *Granger-cause* real exports in the long-run. The ECT indicates that 65 per cent of deviations in exports adjust back towards equilibrium in the current quarter. In the short-run, both the real effective exchange rate and OECD GDP *Granger-cause* export growth, since the lagged coefficients of $\Delta REER$ and $\Delta OECDx$ are significant at the 1 per cent and 5 per cent level, respectively.

Table 11: Error correction modelling and short-run dynamics

Dependent Variable	Coefficients of lagged $\Delta XPPI$	Coefficients of lagged $\Delta REER$	Coefficients of lagged $\Delta OECDx$	ECT
$\Delta XPPI$	-	S (0,0011)	S (0,0307)	-0,6450***
$\Delta REER$	NS (0,8933)	-	NS (0,4628)	0,1001
$\Delta OECD$	NS (0,1956)	NS (0,7759)	-	-0,0168*

Note: *** and * denotes significance at the 1 per cent and 10 per cent level, respectively

The results of Table 11 indicate that there is a *uni-directional* causality running from $OECD_{TOT}$ and REER to XPPI in the short-run. In addition, once again, the results indicate that foreign demand exerts a greater impact on export volumes than the REER.

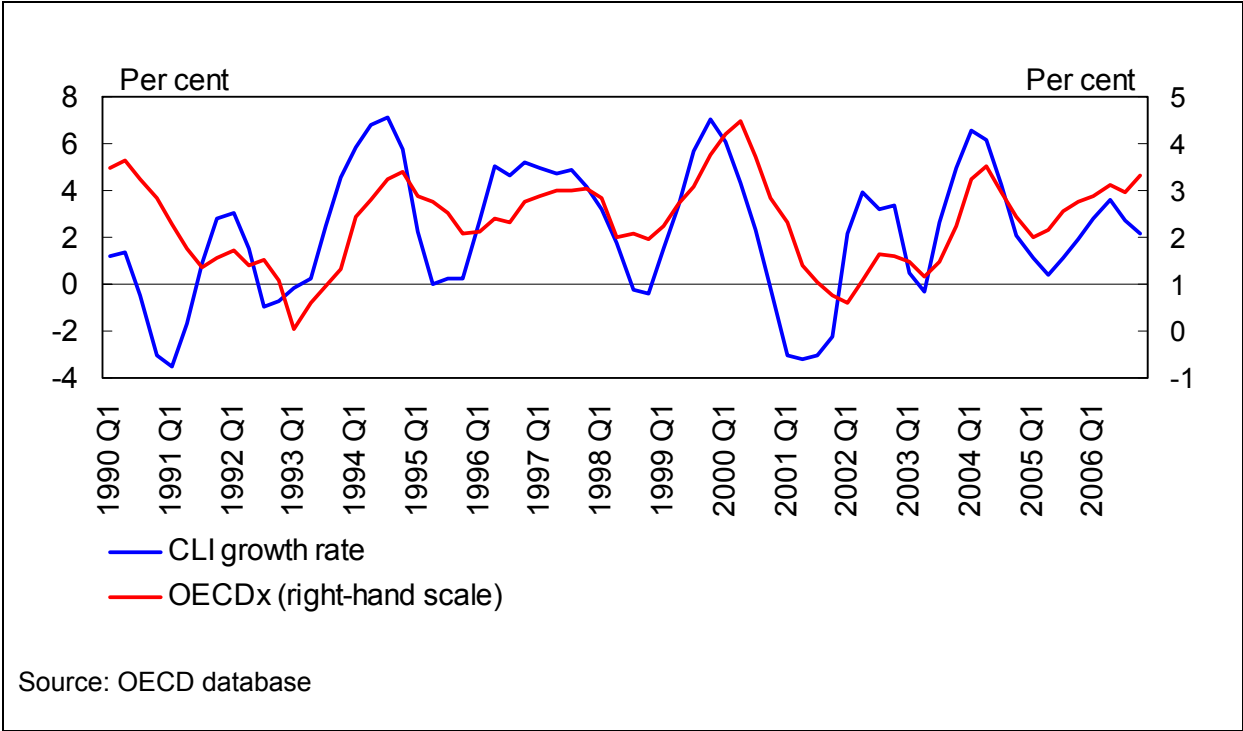
¹⁹ The LR and FPE also identified the optimal lag length as two quarters

7 Probit analysis

The results from the previous section indicate that, in the long-run, South African merchandise exports benefit from increased growth in the OECD. Thus, by anticipating future prospects for the OECD region, it would be possible to anticipate or predict future turning points in South Africa’s real export growth.

The *OECD composite leading indicator* (OECD CLI) provides early signals of future turning points – such as peaks or troughs – in OECD member countries. The index is published on a monthly basis and is available from the OECD database. The strong correlation between the OECD CLI and OECDx is evident in Figure 3. In addition, the CLI appears to be leading OECDx.

Figure 3 OECDx growth and the OECD composite leading indicator



A binary probit model – regressing the lagged composite leading indicator on a real export binary variable – was estimated over the sample period in order to gauge the usefulness of the OECD CLI as a leading indicator of export growth. The OECD CLI is in growth rate form in order to render the variable stationary and allow for the identification of turning points. In addition, as the OECD CLI is a leading indicator of economic activity in the OECD, it has been lagged when included as an explanatory variable in the probit. The results of the probit model are presented in Table 12 below. The coefficient of the CLI is significant and positive thus emphasizing its usefulness in predicting the likely future trend of South Africa exports.

Table 12: Binary probit

Variable	Coefficient	Z-Statistic
Constant	0,4698**	2,1657
CLI _{t-8}	0,1895***	2,6937

Note: *** and ** denotes significance at the 1 per cent and 5 per cent level, respectively
 Source: own calculations

8 Some policy implications and conclusions

This paper used the Johansen multivariate framework to analyse the influence of the real effective exchange rate and foreign demand on South African merchandise exports. Four results have emerged from this analysis. Firstly, foreign demand does matter for South African export performance. This is particularly true for developments in the OECD countries which represent South Africa’s largest export

market. Secondly, there is *uni-directional* causality running from the real effective exchange rate and OECD growth to exports in the long-run and from the real effective exchange rate to exports in the short-term. Thirdly, growth in the OECD countries exerts a larger influence than changes in the REER on South African exports. Finally, a binary probit analysis indicates the possible role of the OECD CLI in forecasting turning points in South Africa's merchandise exports. While stimulating growth in the OECD countries is beyond the scope of domestic policy, the results in this paper suggests that domestic policy should give priority attention to maintaining and promoting trade with OECD countries. In some respects this boils down to securing better and improved market access for SA goods into the OECD countries.

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Appendix

Table A1 Nature of exports to the OECD

Section	Product
1	Live animals
2	Vegetables or vegetable products
3	Animal or vegetable fats
4	Prepared foodstuffs
5	Mineral products
6	Chemicals
7	Plastics
8	Leather
9	Wood products
10	Wood Pulp and Paper
11	Textiles
12	Footwear
13	Stone and glass
14	Precious metals
15	Base metals
16	Machinery
17	Vehicles
18	Scientific equipment

Source: Southern Africa Trade Performance Review 2005