



## REVISED ECONOMIC VULNERABILITY INDEX – 2002

by

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## ABBREVIATIONS

A	ODA as a share of GCF
C1	Top export as a share of total exports
C3	Top three exports as a share of total exports
D1	Export to top trade destination as a share of total exports
D3	Export to top three trade destinations as a share of total exports
E	Imported energy as a share of total commercial energy consumption
ECCB	Eastern Caribbean Central Bank
EVI	Economic Vulnerability Index
EVR	Economic Vulnerability Rank
F	Freight Cost & Insurance as a share of Imports (c.i.f)
FDI	Foreign Direct Investment
GCF	Gross Capital Formation
GFCF	Gross Fixed Capital Formation
GDP	Gross Domestic Product
GDPPC	Gross Domestic Product per Capita
HI	Herfindahl Index
HDI	Human Development Index
I	FDI as a share of GCF
ND(A)	Total affected per capita from natural disasters
ND(D)	Deaths per capita from natural disasters
O	Exports of goods and services as a share of GDP
ODA	Official Development Assistance
Q	Quality of Insertion (share of basic products in total export of goods and services)
SIDS	Small Island Developing States

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## **1. INTRODUCTION**

1.01 It is now generally accepted that gross domestic product (GDP) performance, and in particular per capita GDP trend, does not capture the totality of the development prospects of countries. Some developing countries, although exhibiting good economic performance at particular points in time, possess certain structural features which make it difficult to sustain this trajectory over time and which induce a particular fragility to external shocks. The introduction of the concept of economic vulnerability attempts to draw attention to the underlying ability of countries to sustain and enhance economic progress over time, and to the greater susceptibility of some countries' economic performance to adverse movement due to factors over which they have little or no control.

1.02 The core tenet of the discourse on economic vulnerability is that some developing countries, in particular small ones, are more prone to being adversely affected by external developments because they exhibit or possess certain structural characteristics which put them at greater risk/exposure (*i.e.* increase these probability of the events impacting them) and which reduce their ability to respond or recover. Small size and geography in the form of location, remoteness and exposure to natural disasters are often pointed to as some of the perpetual challenges. The notion that small size constrains development and restricts countries' economic prospects is not new. The calculation of an index of economic vulnerability is intended to capture the structural constraints to economic development faced by small countries over the long term to juxtapose against other indicators of economic performance.

## **2. INDEX OF INHERENT ECONOMIC VULNERABILITY FOR DEVELOPING COUNTRIES**

2.01 Building on the work of Brugglio (1995, 1997) and others (UNCTAD 1997, Wells, 1997; Atkins *et. al* 2000), Crowards (2000b) developed and calculated, what he termed, an index of inherent economic vulnerability index (EVI) for 95 developing countries using data for 1993/94. Inherent economic vulnerability is defined as the "susceptibility of an economy to adverse impacts resulting from external shocks largely beyond the control of the country". Crowards was primarily interested in measuring vulnerability that stemmed from the physical characteristics of the countries rather than from past policy action (Crowards 2000b; p. 1). It is argued that these features force such countries to pursue high risk economic development strategies resulting in greater exposure to external shocks. Specifically, it is posited that the greater exposure arose from:

- trade openness as a result of export-oriented growth and greater reliance on imports because of limited domestic market;
- limited scope for economic diversification giving rise to a limited number of export products/services;
- concentration on a limited number of export destinations (or sources in the case of tourism);
- dependence on imported energy; and
- greater reliance on external financing (both foreign aid and foreign investment) because of the restricted depth of financial markets.

2.02 Peripherality or inaccessibility to/from economic centres and major trading blocks and proneness to natural disasters further magnified this exposure.

2.03 The EVI is intended to capture an economy's exposure to external shocks;<sup>1</sup> and it is a composite index exploring vulnerability arising from five domains or sub-components<sup>2</sup> (referred to as parameters Crowards; 2000b) based on eleven indicators (see Box 1).

### **BOX 1: VARIABLES INCLUDED IN THE VULNERABILITY INDEX**

#### **1. Peripherality and Energy**

i. Peripherality/Accessibility (F)

A proxy measure for this parameter is taken to be freight and insurance costs for imports as a percentage of total import costs. This provides some indication of remoteness from major economic trading partners.

ii. Dependence Upon Imported Energy (E)

Imports net of exports of energy – largely in the form of oil – as a percentage of total energy consumption.

#### **2. Export Concentration**

This is measured in terms of the percentage of total export receipts accounted for by:

- (i) the major export (C1), and
- (ii) the top three exports (C3).

This includes exports of both goods and services, and is combined with information on the openness of the economy measured as total export earnings as a percentage of GDP (O).

#### **3. Convergence of Export Destination**

This is measured in terms of the percentage of total export receipts accounted for by:

- (i) the single most important destination (D1), and
- (ii) the top three most important destinations (D3).

This should include the export of goods. This parameter is also combined with information on the openness of the economy that is measured as total export earnings as a percentage of GDP (O).

#### **4. Reliance upon External Finance/Capital**

Measured as a combination of two variables, both considered as a proportion of annual gross fixed capital formation<sup>1</sup>:

- (i) annual disbursement of concessionary overseas development assistance (A), and
- (ii) annual foreign direct investment (I).

#### **5. Susceptibility to Natural Disasters**

Measured as a combination of two variables, each as a proportion of total population:

- (i) cumulative number of persons affected by natural disasters between 1950 and 2002 (ND(A)); and
- (ii) cumulative number of deaths caused by natural disasters between 1950 and 2002 (ND(D)).

<sup>1</sup>Gross Capital Formation was used to calculate the 2002 EVI instead of Gross Fixed Capital Formation due to data availability issues

<sup>1</sup> Vulnerability is defined as a function of the following three factors:

- Risk of an external shock occurring
- Exposure of an economy to such a shock; and
- The resilience of the economy and its ability to bounce back following a shock.

<sup>2</sup> Except for exposure to natural disasters, these were the same domains that Bruguglio (1997) based his earlier EVI on.

2.04 This present study updates the EVI to 2002. It replicates the methodology developed by Crowards (2000b) for initial comparison of the indices and the country rankings. The study further explores the use of alternative indicators for energy import dependence and export concentration and introduces an additional variable to capture what is termed countries' quality of insertion in the global economy. These various modifications are detailed subsequently.

### **3. METHODOLOGY**

3.01 Crowards derived the EVI using a two stage normalisation process. The raw data for each variable, except energy, was transformed by a fixed exponent (0.3) in order to minimise the distributional skewness. This transformation served to reduce the impact of outliers, preventing any parameter from having an unwarranted influence on the final ranking. The transformed data and the series for energy were then normalised using the following linear scaling method:

$$y_i = \frac{x_i - x_{\min}}{x_{\max} - x_{\min}} \quad (1)$$

3.02 This reduced all indicators to a common scale (0, 1) at the cost of losing interval information. Arithmetical averaging was used to combine the indicators into the various sub-components. These were then re-normalised and averaged to produce the final EVI. The method of arithmetical averaging assumes that each variable raises or decreases the value of the sub-component independently; and similarly changes in each sub-components impact the EVI independently.

### **4. SAMPLE DISTRIBUTION**

4.01 The 2002 EVI is based on a sample of 94 developing countries. The sample exhibited similar distributional characteristics to the 1993/94 sample. It must be noted that:

- (a) the 1993/94 sample size was 95; and
- (b) there were 12 countries which differed between the two samples

4.02 The relative composition of the two samples is given in Table 4.1 and the corresponding descriptive statistics are presented in Tables 4.2 and 4.3. The definitions of the variables are given in Box 1 while country groupings definitions and country classifications are given in Appendix 1.

**TABLE 4.1: PERCENTAGE DISTRIBUTION OF SAMPLES BY COUNTRY GROUPS**

<b>Percentages</b>	<b>2002 Sample</b>	<b>1993/94 Sample</b>
All Countries	100.00	100.00
Landlocked	13.83	13.68
Micro States	14.89	14.74
Medium States	40.43	38.95
Small States	17.02	16.84
Small Island Developing States (SIDS)	23.40	24.21
Islands	25.53	26.32
Large States	27.66	29.47
Caribbean	18.09	17.89

**TABLE 4.2: DESCRIPTIVE STATISTICS OF 2002 SAMPLE<sup>3</sup>**

	<b>F</b>	<b>A</b>	<b>I</b>	<b>ND(D)</b>	<b>ND(A)</b>	<b>O</b>	<b>D1</b>	<b>D3</b>	<b>C1</b>	<b>C3</b>	<b>E</b>	<b>Q</b>
<b>Max</b>	29.6	501.5	99.9	0.01	3.94	182.1	89.4	106.2	81.4	96.2	100.0	95.64
<b>Min</b>	1.1	-0.4	-9.6	0.00	0.00	5.2	9.6	21.4	5.6	14.9	0.0	1.21
<b>Skewness</b>	1.2	3.8	2.9	3.2	2.2	2.1	1.2	0.5	0.8	0.3	-0.4	0.15
<b>Average</b>	9.8	36.6	12.7	0.00	0.55	41.8	32.4	55.3	30.0	49.3	59.1	41.91
<b>Deviation</b>	5.7	74.0	14.6	0.00	0.76	26.4	16.5	17.7	19.5	21.3	41.5	24.35

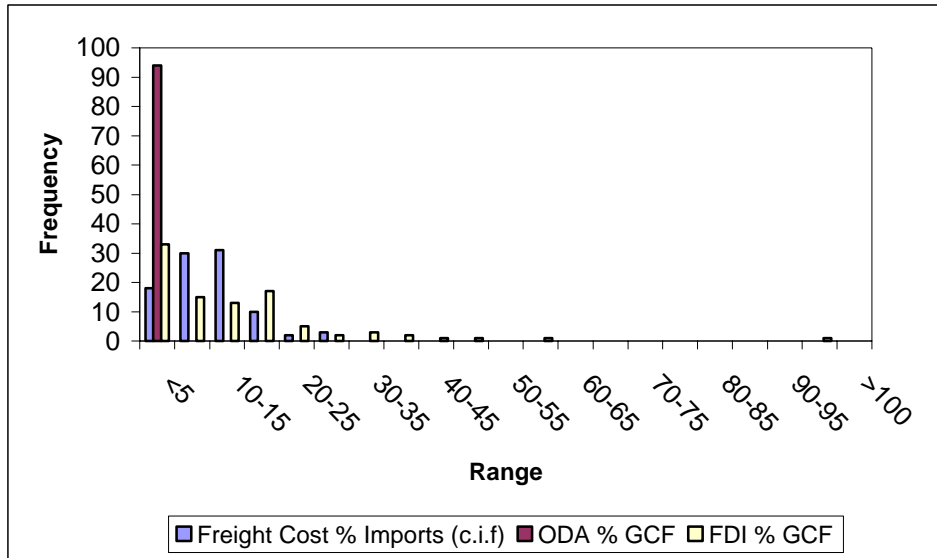
**TABLE 4.3: DESCRIPTIVE STATISTICS OF 1993/94 SAMPLE**

	<b>F</b>	<b>A</b>	<b>I</b>	<b>ND(D)</b>	<b>ND(A)</b>	<b>O</b>	<b>D1</b>	<b>D3</b>	<b>C1</b>	<b>C3</b>	<b>E</b>
<b>Max</b>	27.0	254.5	55.1	0.0	5.2	174.9	83.5	90.3	89.3	94.6	100.0
<b>Min</b>	1.5	0.0	-2.6	0.0	0.0	1.6	10.0	25.1	5.0	12.8	0.0
<b>Skewness</b>	0.7	2.1	1.6	0.0	2.2	1.7	1.3	0.2	0.9	0.3	-0.5
<b>Average</b>	10.0	36.7	10.7	0.0	0.8	39.1	31.8	54.8	32.8	50.1	58.7
<b>Deviation</b>	4.3	52.6	12.5	0.0	1.1	28.8	15.9	15.0	21.9	22.3	41.8

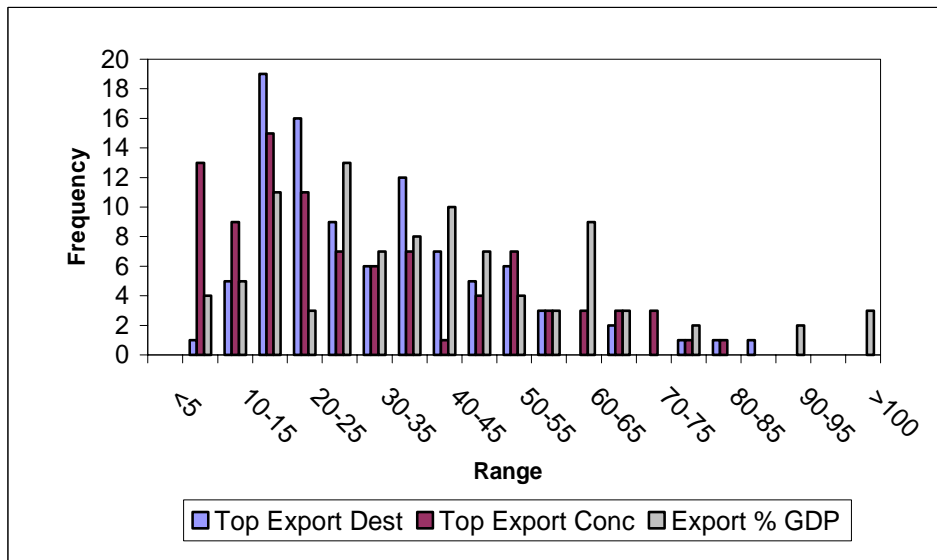
4.03 As with 1993/94 sample, the variables were positively skewed justifying an exponential transformation of 0.3 to minimized skewness. Figures 1-4 show the raw data distribution and the transformed distribution.

<sup>3</sup> Variables, except those related to natural disasters and skewness, are recorded as percentages. Variables related to natural disasters are recorded as per capita ratios. Appendix 2 discusses the variables, the data sources and their limitations in detail.

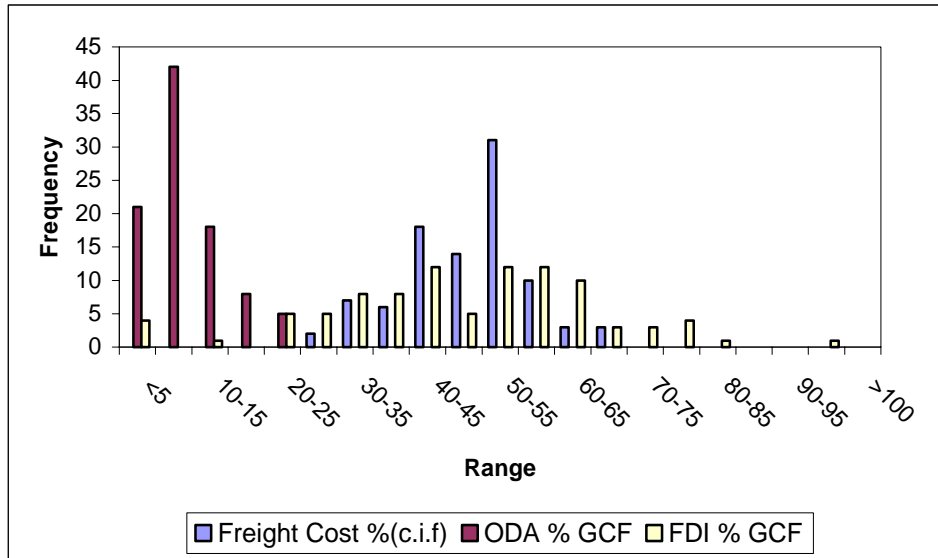
**FIGURE 1: RAW DATA DISTRIBUTION OF EXTERNAL FINANCE AND FREIGHT COST VARIABLES**



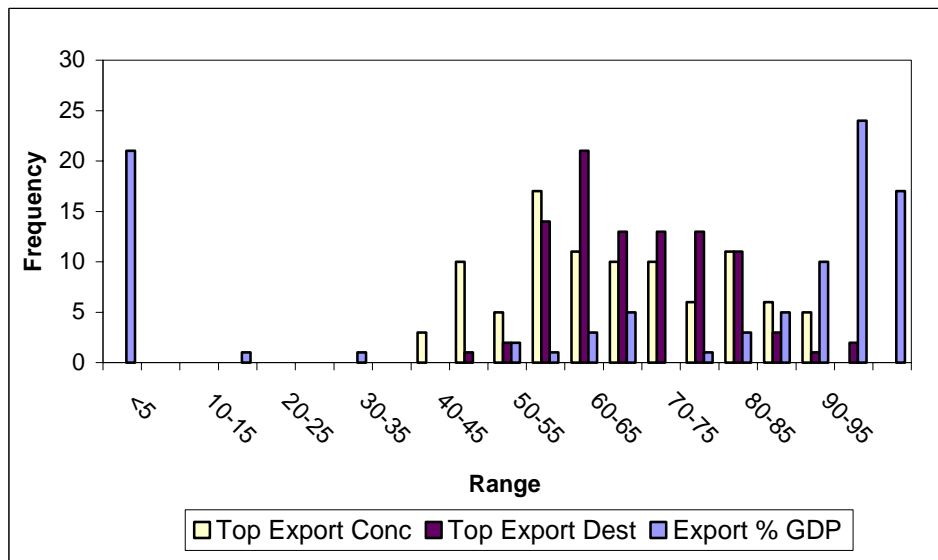
**FIGURE 2: RAW DATA DISTRIBUTION OF TRADE VARIABLES**



**FIGURE 3: TRANSFORMED DATA DISTRIBUTION OF EXTERNAL FINANCE AND FREIGHT COST**



**FIGURE 4: TRANSFORMED DATA DISTRIBUTION OF TRADE VARIABLES**



**5. CROWARDS' TWO STAGE NORMALISATION METHOD**

**Aggregate Rankings**

5.01 Countries are ranked from most vulnerable to least vulnerable with '1' representing the greatest vulnerability. The EVI is inversely related to the rank. Higher scores on the EVI indicate greater vulnerability, while lower scores signify a lower level of vulnerability. The lowest EVI a country can receive is zero, indicating no exposure to external shocks. On the other end of the scale, the highest EVI a country can obtain is one, suggesting overexposure to external shocks.

5.02 Generally, the EVI value and the relative country ranking remained fairly consistent between the two periods. Based on Tables 5.1 to 5.4, the following is noted:

1. The average EVI for all countries for 2002 stood at 0.50; the same as for 1993/94. The normalised value of all the constituent indicators, with the exception of the number of deaths from the natural disasters, decreased.
2. An examination of the EVI by country grouping revealed decreases for all groups except medium, micro-states and SIDS; with the largest decrease recorded by landlocked states.
3. Caribbean countries showed less vulnerability on all indicators except vulnerability due to the number of deaths attributed to natural disasters.
4. Caribbean countries experienced a relative drop in their vulnerability due to them becoming less vulnerable to freight cost than medium states and landlocked countries. Caribbean countries' EVI moved closer to the average of all countries in 2002.
5. Landlocked countries recorded a drop in their 2002 EVI due to a fall in Official Development Assistance (ODA) as a share of GDP relative to other countries, and a decrease in vulnerability arising from trade shocks.
6. In keeping with apriori expectations micro-states and SIDS continued to display the greatest vulnerability and large states the least vulnerability. The source of this vulnerability lay in their greater exposure to trade shocks, higher energy import dependence and higher freight cost compared to the rest of the sample.

**TABLE 5.1: EVI BY COUNTRY GROUPING AND INDICATORS<sup>4</sup> - 2002**

<b>Country Grouping</b>	<b>F</b>	<b>A</b>	<b>I</b>	<b>ND(D)</b>	<b>ND(A)</b>	<b>O</b>	<b>D1</b>	<b>D3</b>	<b>C1</b>	<b>C3</b>	<b>E</b>	<b>EVI</b>
All Countries	0.51	0.39	0.64	0.34	0.44	0.42	0.43	0.51	0.47	0.54	0.59	0.50
Caribbean	0.52	0.35	0.69	0.38	0.52	0.51	0.53	0.62	0.69	0.75	0.88	0.62
Islands	0.60	0.37	0.72	0.36	0.46	0.54	0.51	0.61	0.66	0.74	0.90	0.63
Landlocked	0.54	0.55	0.60	0.31	0.48	0.33	0.40	0.52	0.43	0.51	0.62	0.50
Large States	0.40	0.25	0.60	0.36	0.42	0.36	0.35	0.40	0.31	0.34	0.28	0.36
Medium States	0.53	0.44	0.64	0.32	0.43	0.41	0.43	0.50	0.45	0.51	0.57	0.50
Micro States	0.62	0.42	0.72	0.44	0.55	0.53	0.50	0.62	0.73	0.79	0.98	0.68
Non-small States	0.48	0.36	0.63	0.34	0.43	0.39	0.40	0.46	0.39	0.44	0.45	0.44
SIDS	0.61	0.39	0.72	0.38	0.48	0.53	0.50	0.61	0.68	0.77	0.89	0.64
Small States	0.51	0.39	0.64	0.34	0.44	0.42	0.43	0.51	0.47	0.54	0.59	0.62

<sup>4</sup> The country groups' definitions were identical to those defined by Crowards (2000b)

**TABLE 5.2: EVI BY COUNTRY GROUPING AND INDICATORS - 1993/94**

<b>Country Grouping</b>	<b>F</b>	<b>A</b>	<b>I</b>	<b>ND(D)</b>	<b>ND(A)</b>	<b>O</b>	<b>D1</b>	<b>D3</b>	<b>C1</b>	<b>C3</b>	<b>E</b>	<b>EVI</b>
All Countries	0.53	0.42	0.64	0.27	0.44	0.48	0.43	0.54	0.49	0.57	0.59	0.50
Caribbean	0.62	0.36	0.81	0.29	0.53	0.60	0.65	0.72	0.71	0.78	0.92	0.64
Islands	0.61	0.37	0.78	0.26	0.48	0.63	0.56	0.68	0.67	0.73	0.86	0.68
Landlocked	0.60	0.63	0.59	0.27	0.42	0.37	0.33	0.51	0.50	0.55	0.61	0.67
Large States	0.43	0.25	0.60	0.24	0.40	0.38	0.36	0.43	0.36	0.44	0.24	0.44
Medium States	0.53	0.53	0.61	0.29	0.45	0.46	0.41	0.53	0.45	0.55	0.62	0.50
Micro States	0.62	0.37	0.86	0.27	0.46	0.65	0.57	0.68	0.77	0.83	0.98	0.64
Non-small States	0.49	0.41	0.61	0.27	0.43	0.43	0.38	0.48	0.41	0.50	0.45	0.59
SIDS	0.63	0.37	0.78	0.27	0.49	0.61	0.56	0.68	0.70	0.76	0.89	0.51
Small States	0.63	0.45	0.72	0.27	0.46	0.59	0.52	0.67	0.67	0.76	0.89	0.63

**TABLE 5.3: VULNERABILITY RANKS BY COUNTRY GROUPING AND INDICATORS – 2002**

<b>Country Grouping</b>	<b>F</b>	<b>A</b>	<b>I</b>	<b>ND(D)</b>	<b>ND(A)</b>	<b>O</b>	<b>D1</b>	<b>D3</b>	<b>C1</b>	<b>C3</b>	<b>E</b>	<b>EVR</b>
All Countries	46	48	48	48	48	48	48	48	48	48	44	48
Caribbean	37	51	30	41	37	30	35	34	28	27	17	22
Islands	30	50	31	43	46	27	38	36	29	27	16	23
Landlocked	45	27	54	53	42	57	50	46	53	51	50	48
Large States	63	68	56	45	50	59	58	62	63	65	64	72
Medium States	46	39	47	52	48	50	47	48	50	51	50	48
Micro States	23	41	32	34	37	28	38	35	23	20	10	14
Non-small States	53	50	51	49	49	54	52	54	55	57	56	58
SIDS	28	47	32	41	44	28	38	36	27	23	17	22
Small States	39	41	47	53	52	40	39	33	37	34	26	25

**TABLE 5.4: VULNERABILITY RANKS BY COUNTRY GROUPING  
AND INDICATORS – 1993/94**

<b>Country Grouping</b>	<b>F</b>	<b>A</b>	<b>I</b>	<b>ND(D)</b>	<b>ND(A)</b>	<b>O</b>	<b>D1</b>	<b>D3</b>	<b>C1</b>	<b>C3</b>	<b>E</b>	<b>EVR</b>
All Countries	47	48	47	47	47	48	48	48	48	47	43	48
Caribbean	28	54	23	40	37	26	22	26	25	25	16	17
Islands	32	52	26	45	43	23	32	31	29	30	19	24
Landlocked	34	27	59	51	48	65	61	52	46	47	48	48
Large States	65	69	55	52	53	63	58	63	63	60	64	75
Medium States	47	34	52	44	45	51	50	49	53	50	48	46
Micro States	25	52	15	44	46	19	30	30	19	19	10	16
Non-small States	55	50	53	47	48	57	53	55	57	55	55	59
SIDS	28	52	27	45	42	24	32	31	26	27	18	22
Small States	29	44	34	46	45	29	36	32	28	27	19	24

5.03 These changes in the EVI are reflected in the country group rankings. Improvement in the ranking of the following country groupings was noted for 2002: Caribbean states, medium states, and small states; while island states, large states, micro states and non-small states average ranking fell. Small states' average ranking improved while that of the non-small states decreased marginally implying some convergence of economic susceptibility between small states and non-small states. However, these changes did not cause a re-ordering of the country groups. As a result, similar conclusions between the two samples can be drawn. SIDS are among the most vulnerable with non-small states being among the least. The average ranking of the landlocked countries remained unchanged.

#### **Individual Country Rankings**

5.04 Given the passage of time and the variation between the samples, it is expected that countries would experience changes in their rankings. Details on individual countries' EVI and their rank are presented in Appendices 3 and 4. It is of interest to note that the majority of shifts in rank, approximately 60%, remained within a 10 point (pt) band<sup>5</sup> indicating very little variation from their 1993/94 rankings. Table 5.5 below displays the number of countries which moved within particular bands.

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<sup>5</sup> A shift within a 10pt band indicate countries which moved a maximum distance of + or – 10 places of their original rank.

**TABLE 5.5: MAGNITUDE SHIFTS BETWEEN 2002 AND 1993/94**

<b>Shift Magnitude</b>	<b>Cumulative</b>	<b>Differential</b>
0	4	4
5	37	33
10	56	19
15	68	12
20	76	8
>20	82	6
Not in sample	12	12
Total	94	94

5.05 There were no systematic movements in ranking among groups. Major shifts were associated primarily with changing trading patterns and variation in external financing. Major shifts included:

1. Sudan's fall in rank from 57 in 1993/4 to 20 in 2002 was due to expanding trade with China which accounted for approximately 78% of their exports in 2002.
2. Barbados' rank moved from 36 in 1993/94 to 51 in 2002. This fall in vulnerability was largely attributable to increased export diversification. Its top three export products (including services) accounted for 71% of total exports in 1993/94; while these only accounted for 66% in 2002. Similarly, the top three export destinations only accounted for 37% of all exports in 2002 compared to 62% in 1993/94.
3. Bahrain's ranking dropped from 79 in 1993/94 to 60 in 2002 as a result of an increase in the share of petroleum and related products in its exports. This gave rise to greater export concentration.
4. Costa Rico's ranking rose from 33 in 1993/94 to 80 in 2002 as it diversified its trading partners. In 1993/94 Costa Rico's top export destination accounted for 55.61% of exports, while it only accounted for 15.47% in 2002.
5. Pakistan's ranking dropped from 82 in 1993/94 to 58 in 2002 because of increased susceptibility to natural disaster.
6. Antigua and Barbuda displayed less vulnerability and its rank moved from 5 to 19. Reduced level of openness (export share of GDP fell from 96% to 61%) and dependence on foreign finance were the main factors behind the shift.
7. Czech Republic's rank deteriorated from 89 to 76 due to greater reliance on foreign investment (foreign investment share of GCF moved from 6% to 42%); increased dependence on exports and greater export concentration; and a rise in energy dependence.
8. Guyana's rank improved from 8 to 36 mainly as a result of a decline on freight costs as a share of import, reduced dependence on external finance and a more favourable trade structure. Exports earnings accounted for a smaller share of GDP and there was decreased destination and product concentration in 2002.

9. Cyprus exhibited greater vulnerability as its rank slipped from 53 to 31. Increased dependence on external finance largely accounted for this.
10. Cote d' Ivorie moved 20 places lower to 53 largely due to greater integration in the global economy on more unfavourable terms – the level of openness increased while export product concentration rose. This country was still highly dependent on external finance, but some decrease in this dependence was noted.
11. Kenya's rank went from 49 to 69 over the period. Vulnerability across all domains appeared to have decreased.
12. Trinidad and Tobago moved from 59<sup>th</sup> place to 75<sup>th</sup> place mainly because of decreasing freight cost as a share of imports, but the country appears to have become more vulnerable due to its trade patterns. Exports as a share of GDP increased from 44% to 54% and export destination concentration rose. The dependence on foreign investment persisted.

## **6. ONE STAGE NORMALISATION METHOD**

6.01 Initially, a two stage normalisation process was used in transforming the variables for the calculation of the 2002 EVI. As explained above, this involved combining normalised indicators to obtain sub-components which were also normalized to derive the components. In the one stage normalisation procedure, only the indicators are transformed and combined into the final EVI. As such, this modification only affects the components and EVI, but have no impact on the indicators. A negligible change was observed in the results with this modification, implying little variation in sensitivity to the indicators between the two models (refer to Table 6.1). EVI and Economic Vulnerability Rank (EVR) for individual countries are given in Appendices 5 and 6.

**TABLE 6.1: COMPARISON OF 2002 EVI AND EVR USING THE TWO STAGE AND ONE STAGE NORMALISATION METHODS**

<b>Country Groupings</b>	<b>EVI</b>		<b>EVR</b>	
	<b>Two Stage</b>	<b>One Stage</b>	<b>Two Stage</b>	<b>One Stage</b>
All Countries	0.50	0.48	48	48
Caribbean	0.62	0.57	22	25
Islands	0.63	0.58	23	22
Landlocked	0.50	0.48	48	48
Large States	0.36	0.37	72	73
Medium States	0.50	0.48	48	48
Micro States	0.68	0.62	14	14
Non-small States	0.44	0.43	58	58
SIDS	0.64	0.59	22	21
Small States	0.62	0.57	25	25

6.02 The shift magnitude table explored the cumulative and differential changes in rank between the one stage and two stage normalization process. Table 6.2 shows that all of the shifts fell within a small 10-point band, supporting the above conclusion of negligible differences in the two procedures.

**TABLE 6.2: SHIFT MAGNITUDE OF 2002 ONE STAGE NORMALISATION**

<b>Shift Magnitude</b>	<b>Cumulative</b>	<b>Differential</b>
0	13	13
5	82	69
10	94	12
15	94	0
20	94	0
>20	94	0
<b>Total</b>	<b>94</b>	<b>94</b>

## **7. VALIDATION**

### **Sensitivity Analysis**

7.01 Sensitivity analysis tests the robust nature of the index. It ascertains the degree of variation of the index due to small changes in its constituent elements. Robustness is a desired quality in the EVI as it measures the index susceptibility to small errors in the components' values. Economic data errors are often unavoidable due to a lack of availability, which may require imputation or elimination of observations, and differing collection and recording methodologies across sources. For example, freight cost was estimated as a percentage of imports (c.i.f) in some indices. In other cases, it was calculated as the difference in imports (c.i.f) and imports (f.o.b) as a percentage of imports (c.i.f). For countries in which the freight costs were determined using both methods, the value varied. Montserrat's estimated freight cost by the first method was 12% while that estimated by the second method was 2.7%. If the index lacks robustness, Montserrat's EVI would shift widely to reflect this change. As the accuracy of either estimate cannot be verified independently, it is desirable that Montserrat's EVI shifts minimally.

7.02 The maximum deviation of the index due to a change in any component was examined by altering the weights of the components or indicators. Wide fluctuations would signal undue sensitivity to certain components and would warrant further inspection of those components. Sensitivity of the 2002 EVI to the following was analysed:

1. removal of the Peripherality/Energy Component;
2. removal of the Export Concentration Component;
3. removal of the Export Destination Component;
4. removal of the External Finance Component;
5. removal of the Natural Disasters Component;

6. removal of the Energy Variable;
7. removal of the Peripherality Variable; and
8. doubling the weight of the Peripherality/Energy Component – equivalent to treating the energy indicator and the freight cost indicators as separate components.

7.03 The results of the sensitivity analysis are given in Figures 5-6<sup>6</sup>. The sensitivity test of the two stage normalised EVI revealed that:

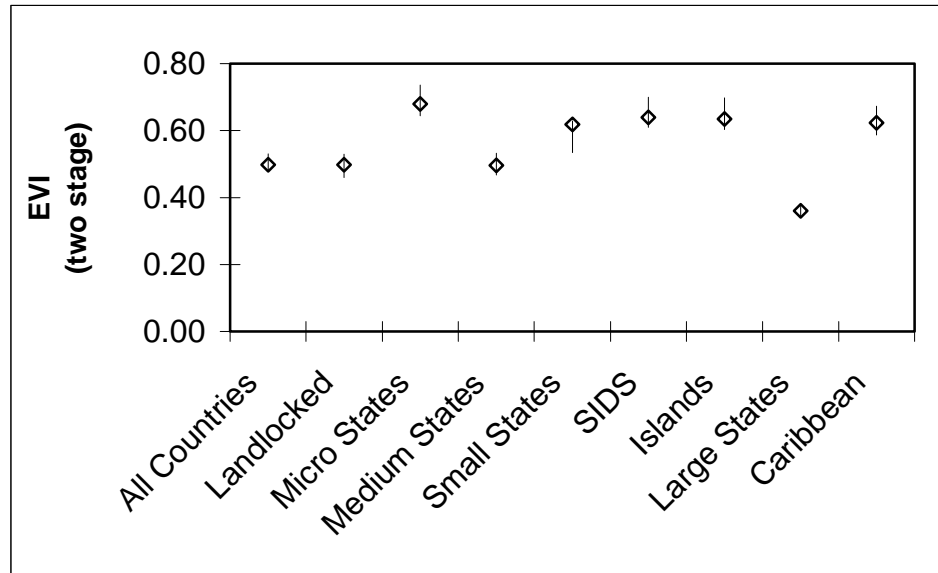
1. All country groupings became more vulnerable when the Natural Disasters Component was removed and was less vulnerable when the Energy Variable was removed.
2. Omitting the Export Destination component had very little effect on any of the country groups' indices.
3. Landlocked countries showed less vulnerability with the removal of the External Finance component.
4. Micro States became more vulnerable when the Peripherality variable was removed and remained unchanged when the Export Destination component was omitted.
5. SIDS and Caribbean nations displayed less vulnerability when the Export Concentration and the Peripherality/Energy components were omitted.
6. Doubling the weight on the Peripherality/Energy component caused all country groups to become more vulnerable, except for Large States which remained unchanged.

7.04 Figure 5 displays the results of the sensitivity tests for the EVI. Non-small states and landlocked states were markedly robust to changes in the components while small and microstates experienced greater fluctuations in their indices. SIDS, micro states and small states maintained much higher vulnerability indices than their landlocked and large states counterparts even when allowing for the largest changes. The widest divergence from the original indices occurred in those of micro states and islands. Overall these results indicate robustness in the index to significant changes in its composition.

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<sup>6</sup> Detailed calculations are available on request. Details are provided for Caribbean countries in Appendix 7.

**FIGURE 5: SENSITIVITY OF COUNTRY GROUPINGS' AVERAGE EVI (TWO STAGE)**

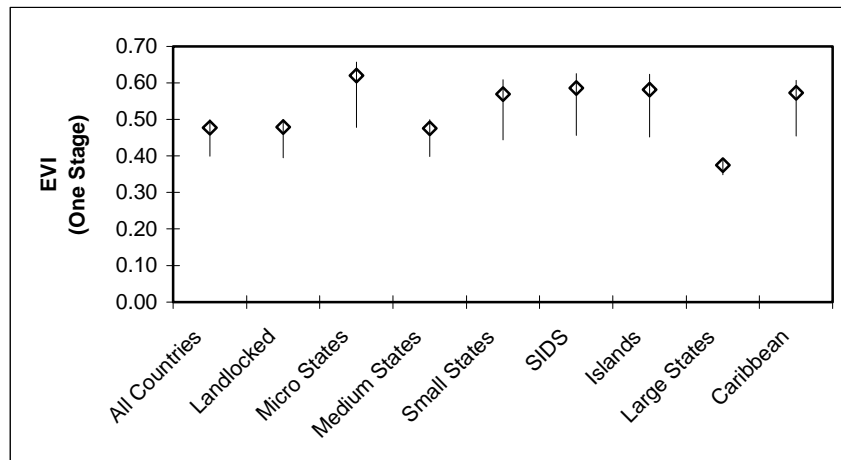


7.05 The behaviour of the index to the sensitivity tests for the one stage normalized EVI differed as follows:

1. Omitting the Peripherality variable caused an upward deviation (i.e. become more vulnerable) from the original index for the All Country group.
2. Omitting the Natural Disasters component was the only one which caused an increase in the EVI for SIDS.
3. Omitting the Energy variable produced the greatest upward deviation for the Caribbean.
4. Omitting the External Finance component caused the greatest downward deviation for large states.
5. Doubling the weight of the Peripherality/Energy component caused the greatest downward deviation (i.e. become less vulnerable) for all country groups.

7.06 Figure 6 illustrates the results of the sensitivity tests for the one stage normalised parameters. The overall deviation of the index for each country group is greater than that for the two stage normalised parameters. The EVI based on the two stage normalization procedure displays greater robustness to the sensitivity tests than the one stage normalization procedure.

**FIGURE 6: SENSITIVITY OF COUNTRY GROUPS' AVERAGE EVI (ONE STAGE)**



### Correlation

7.07 The indicators and the sub-components were all assigned equal weight in the computation of the EVI. An alternative technique for determining components' weights is principal component analysis. It prevents double counting by adjusting the weights of correlated variables to accurately reflect their contribution to the index. One requirement of this technique is positively correlated variables or components.

7.08 There was very little correlation between any of the components (Table 7.1) and any of the variables (except the trade variables) (Table 7.2). Ignoring trade variables, the largest correlation coefficient among the variables was 0.32 and 0.44 among components. These outcomes are in line with expectations as there is little theoretical reason to expect the subcomponents to be correlated with each other. The amount of external financing a country receives will not impact the amount of energy a country imports relative to its consumption. The number of people affected by natural disasters obviously has no effect on destination convergence. The independence of these variables and components does not warrant principal component analysis.

**TABLE 7.1: CORRELATION OF COMPONENTS**

	<b>EVI</b>	<b>Peripherality &amp; Energy</b>	<b>Export Concentration</b>	<b>Export Destination</b>	<b>External Finance</b>	<b>Natural Disasters</b>
<b>EVI</b>	1.00	0.76	0.54	0.60	0.63	0.46
<b>Peripherality &amp; Energy</b>		1.00	0.32	0.23	0.44	0.22
<b>Export Concentration</b>			1.00	0.21	0.10	-0.14
<b>Export Destination</b>				1.00	0.20	0.12
<b>External Finance</b>					1.00	0.32
<b>Natural Disasters</b>						1.00

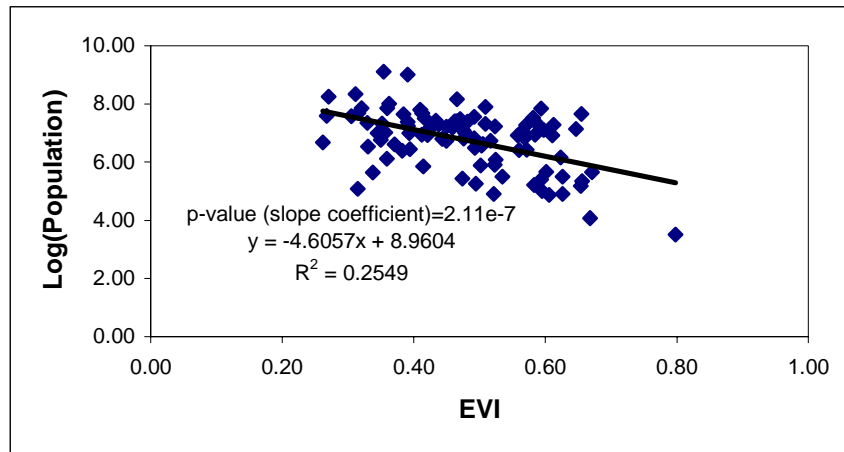
**TABLE 7.2: CORRELATION OF VARIABLES**

	F	A	I	ND(D)	ND(A)	O	D1	D3	C1	C3	E
F	1.00	0.32	0.06	-0.01	0.05	-0.07	0.14	0.23	0.33	0.27	0.18
A		1.00	-0.09	0.21	0.21	-0.19	0.03	0.28	0.15	0.20	0.26
I			1.00	-0.08	-0.11	0.23	0.19	0.16	0.13	0.07	0.08
ND(D)				1.00	0.66	-0.04	0.09	0.14	0.03	0.08	0.08
ND(A)					1.00	-0.10	0.06	0.15	-0.08	-0.01	0.14
O						1.00	-0.11	-0.02	0.13	0.05	0.12
D1							1.00	0.84	-0.02	-0.04	0.14
D3								1.00	0.08	0.06	0.23
C1									1.00	0.88	0.08
C3										1.00	0.20
E											1.00

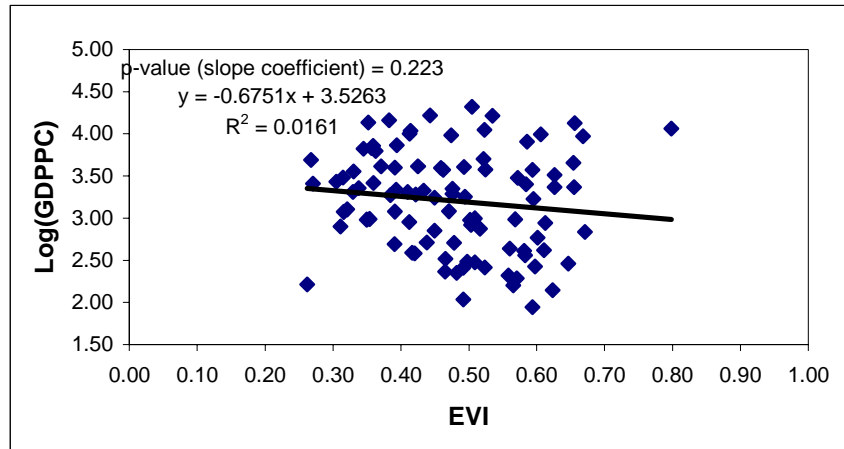
**External Validation**

7.09 External validators are items which are expected to correlate with the components and index but do not form part of the index’s composition. These are variables expected to be related to the index. One of the key arguments of the supporters of vulnerability analysis is that small size (whether considered in terms of population or market) increases vulnerability. Therefore the EVI is expected to be inversely related to size. Two validators, population size and gross domestic product per capita (GDPPC), are investigated. These results are presented in Figures 7 and 8.

**FIGURE 7: CORRELATION OF EVI AND POPULATION**



**FIGURE 8: CORRELATION OF VULNERABILITY INDEX AND GDPPC**

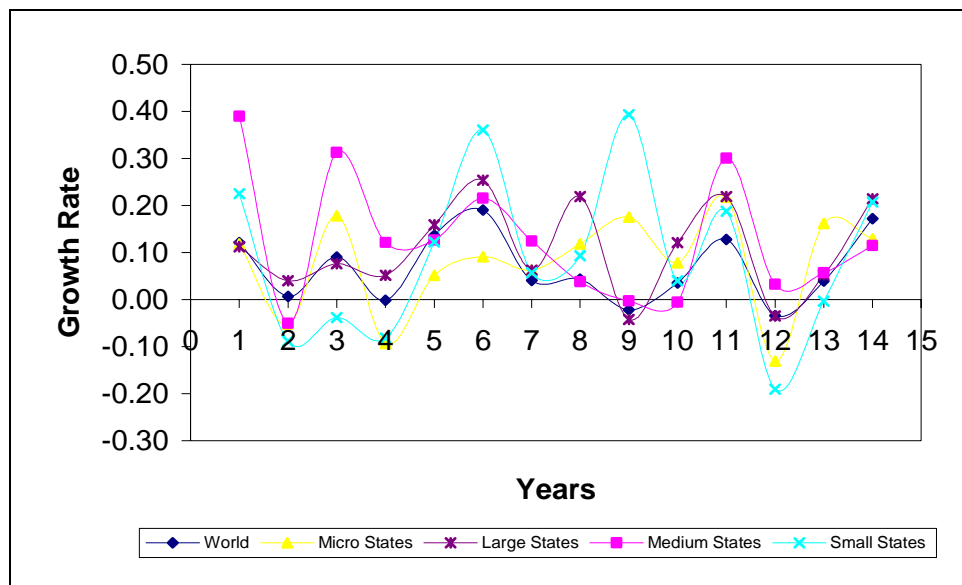


7.10 In both cases, vulnerability and the size indicators are inversely related. The correlation coefficient is stronger in the case of the population variable and significant. The weak and insignificant relationship between vulnerability and GDP per capita has been confirmed in other studies. Armstrong and Read (2002) argued that while vulnerability may affect long run growth performance it is insignificant as a determinant of cross-sectional levels of income per capita. They concluded that vulnerability is only observable as a time series phenomenon. This implies alternative validators have to be found.

### **Export Correlation**

7.11 The export growth of small and micro states is more susceptible to economic shocks because of greater openness, higher product and export market concentration, and the nature of products traded. This is exhibited by a greater degree of variation in their export growth when compared to non-small states over time. The degree of variation is illustrated in Figure 9. Small states' exposure to shocks created large volatility in its export growth. However, this volatility was not shared by microstates which appear relatively resilient to such shocks. Their export variation was slightly larger than that of large states, but smaller than that of medium states. Small states, having more resources than microstates, are able to integrate themselves more firmly into the world economy leaving them more susceptible to economic shocks. Thus their exports are subjected to the global business cycle to a larger extent than micro states.

**FIGURE 9: COMPARISON OF EXPORT GROWTH RATES OF COUNTRY GROUPS BETWEEN 1990 AND 2003**



## 8. MODIFICATIONS

### New Energy Proxy

8.01 Crowards proxied energy import dependence by net energy imports as a percentage of total energy consumption. Energy equivalent units were used rather than the current value of net energy imports. The vulnerability with respect to energy import dependence arises not only from the extent to which a country energy needs have to be met from external sources, but also from the possible fluctuations of energy prices, given the inelastic demand for energy products, and the resulting impact on the balance of payments. Assuming energy supplies are not constrained, the vulnerability arising from dependence on energy imports is strictly related to ability to pay for these. Thus consideration of vulnerability arising from energy dependence cannot be divorced from its balance of payments effect. Therefore it seems appropriate to use **net energy imports relative to export earnings** as an indicator of vulnerability. The greater the share of export earnings absorbed by energy imports the more vulnerable the country.

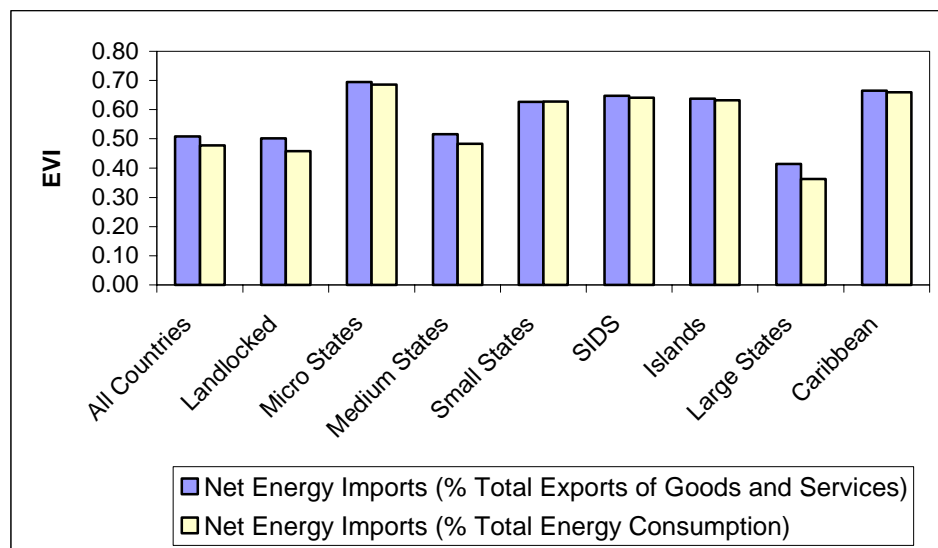
8.02 The sample reduces to 72 countries with the introduction of the new proxy variable for energy dependence. The percentage of non small states in the sample rose, while that of the small states fell. Table 8.1 gives the reduced sample composition.

**TABLE 8.1: 2002 SAMPLE COMPOSITION FOR THE ORIGINAL AND NEW ENERGY PROXIES**

Country Groupings	Original	New
All Countries	100.00	100.00
Landlocked	13.83	12.50
Micro States	14.89	12.50
Medium States	40.43	43.05
Small States	17.02	11.11
SIDS	23.40	16.67
Islands	25.53	18.05
Large States	27.66	33.33
Caribbean	18.09	15.28

8.03 Overall the EVI for all countries rose marginally with use of new energy proxy, but no shift in country groups ranking occurred as shown in Figure 10. Given no major shifts between countries resulted with the introduction of the new energy proxy and it reduced the sample size considerably, this proxy is not utilised in the final calculation of the EVI for 2002.

**FIGURE 10: EVI USING DIFFERENT ENERGY PROXIES**



**Export Concentration: Herfindahl Index**

8.04 The Herfindahl Index (HI) is used as an alternative measure of export concentration. The HI is calculated as the sum of the square of the share of each product category in total exports. This index accounts for the share of each export category (based on the SITC classification) and places greater emphasis on goods and services comprising the larger export earners. The HI value ranges between zero and one, with zero indicating an infinite number of products making up the export basket and one a mono-product exporter. The HI is a more comprehensive measure of export concentration as it accounts

for all goods and services exported during a given year. UNCTAD's data on the SITC three digit level of exports classification were combined with its most detailed categorization level of services<sup>7</sup>.

8.05 In only four cases, the sum of the shares deviated from the expected value of one. These were Burkino Faso, Seychelles, Tunisia and Vietnam<sup>8</sup>. This resulted from incomplete classification of all their goods components. This creates a downward bias, though insignificant, on the HI and their EVI. Thus these countries may appear to be relatively less vulnerable.

8.06 Table 8.2 compares the results for the EVI and the EVR using the different proxies for export concentration. The use of HI results in smaller export concentration indices for all country groupings except the large states. This is understandable since Croward's only accounted for the top export and top three exports. In contrast, the HI considers all exports placing a greater weight on larger export items. The EVI for all but the larger countries shifted downwards, but the relative ranking remained consistent. For future calculations of the EVI, the HI should be utilised as it gives a more complete picture of export product concentration than the top one or top three export items.

**TABLE 8.2: COMPARISON OF EXPORT CONCENTRATION INDEX AND OVERALL EVI & EVR USING DIFFERENT CONCENTRATION PROXIES**

Country Groupings	Average of top one and top three exports			HI		
	Export Concentration	EVI	EVR	Export Concentration	EVI	EVR
All Countries	0.52	0.50	48	0.45	0.47	48
Landlocked	0.46	0.50	47	0.31	0.46	51
Micro States	0.79	0.68	14	0.66	0.61	15
Medium States	0.50	0.50	47	0.42	0.47	49
Small States	0.71	0.62	25	0.58	0.56	26
SIDS	0.76	0.64	21	0.63	0.58	22
Islands	0.75	0.63	22	0.65	0.58	22
Large States	0.34	0.36	74	0.36	0.38	70
Caribbean	0.75	0.62	25	0.63	0.57	26

### Quality of Global Insertion

8.07 Small countries are forced to engage in trade for their survival. Small size (both physical and market) limits what can be produced domestically and, as a consequence, such countries must export to earn the foreign exchange to pay for their imports. Hence these countries are expected to exhibit a greater degree of openness than larger countries. Whilst greater openness logically implies greater exposure to external shocks, the quality of the insertion in the global economy mediates this. The quality of insertion speaks to the pattern of export specialisation (i.e. product mix). It matters greatly whether countries are specialised in stagnant and/or volatile export sectors (sectors such as primary products and basic manufactures with low income and price elasticity of demand or variable demand) or dynamic and/or stable export sectors (i.e. sectors that incorporate technological progress and face stable demand).

<sup>7</sup> Data sources and exact definitions can be found in Appendix 2.

<sup>8</sup> Vietnam's services were not disaggregated and these were categorized under other business services. These services contributed 15% of export earnings, thus placing an upward bias on its HI and EVI.

Countries that are specialised in the former are expected to display much more fragility than those specialised in the latter and to diverge from a sustained convergent growth path.

8.08 Grynberg and Razzaque (2003) compiled data which showed that small states are being marginalised in global trade, *i.e.* their share of merchandise trade has shrunk as well their trend growth rate in services export over 1980 -2000 is lower than that of the rest of the world. Dependence on primary products was identified as instrumental in such countries' marginalisation. A case study of Chile also suggests that dependence on primary products and exports with low technological content also induces marginalisation (Di Maio; 2001). Many developing countries, due to historical reasons, are trapped in exporting products in stagnant or highly volatile sectors resulting in their increasing marginalisation in world trade. The pattern of export specialisation because of its historical antecedents and its enduring nature can thus be considered one of the defining structural characteristics of most developing countries<sup>9</sup>. The nature of countries' exports is as much as a source of vulnerability as is reliance on a few exports or on a limited number of export markets.

8.09 A variable proxying export specialisation is thus introduced in the EVI for 2002. This is defined as the export product mix comprising the share of agriculture and other basic products in exports (SITC 0 – 2 + 4 +68) plus tourism (because of the volatile nature of this service export) relative to overall export of goods and services (all SITC categories plus total service exports). Data on export composition from UNCTAD data base are utilised. Travel as listed by UNCTAD was used to proxy tourism. This variable accounts not only for leisure travel but for business travel, suggesting an upward bias in the indicator for tourism intensive economies. This may make them appear more vulnerable than they are. The quality of global insertion variable is weighted by each country's level of export openness.

8.10 For purely statistical reasons and to minimise some of the resulting impact of data deficiency, Crowards treated energy and peripherality as independent indicators for the same sub-component – Peripherality and Energy. This lacked any theoretical justification (Crowards, 2000b; p. 12). In the revised EVI, energy and peripherality are treated as distinct sub-components of vulnerability. The EVI is calculated by averaging the seven sub-components. The results are presented in Table 8.3 and Appendix 8. All country groupings, with the exception of large states, experienced greater vulnerability in its EVI. The results clearly show that countries' export product mix dominated by primary products, and other goods and services with volatile demand, enhances vulnerability considerably. The large states, because of exports with greater technology content, remained resilient as usual with no change in its vulnerability index.

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<sup>9</sup> Crowards acknowledged that the structure of an economy *i.e.* the extent to which this is based on the production of primary products etc could influence susceptibility to shock, but this was not used as an indicator because he argued that it was not easy to determine which type of structure is more vulnerable and it is not clear alternative structures are an inherent feature (P.3).

**TABLE 8.3: COMPARISON OF OVERALL EVI AND EVR**  
**QUALITY OF GLOBAL INSERTION**

Country Groupings	2002 Original		2002 Augmented		Quality of Insertion Indicator	Quality of Insertion Index
	EVI	EVR	EVI	EVR		
All Countries	0.50	48	0.51	48	0.42	0.55
Landlocked	0.50	47	0.52	46	0.52	0.55
Micro States	0.68	14	0.71	13	0.62	0.80
Medium States	0.50	47	0.51	47	0.41	0.54
Small States	0.62	25	0.65	23	0.42	0.73
SIDS	0.64	21	0.67	20	0.55	0.75
Islands	0.63	22	0.66	20	0.53	0.75
Large States	0.36	74	0.36	76	0.24	0.36
Caribbean	0.62	25	0.65	22	0.58	0.76

8.11 The rank of Caribbean countries fell, while that of the medium states remained unchanged and the large states' rank improved. The EVI for Caribbean States, small states and micro-states exceeded the average, with the micro-states exhibiting the highest level of vulnerability. The EVI for all Caribbean Countries rose with the exception of Trinidad and Tobago, Montserrat and Haiti; and the ranking of all, but Trinidad and Tobago and Haiti, decreased. Reliance on energy exports in the case of Trinidad and Tobago and the very low integration of Haiti in the global economy explain these outcomes. An examination of the quality of insertion index reveals that among the Caribbean countries, Montserrat, Anguilla, St. Lucia and Dominica are most likely to suffer set backs due to their export product mix.

## **9. CONCLUSION**

9.01 The underlying premise of economic vulnerability analysis is that structural factors affect the performance of small states. The EVI is intended to measure the restrictions to the development of small states arising from factors over which such countries have little or no control. The focus is on measuring the susceptibility of countries to external shocks. It does not treat the role of endogenous policies in mitigating vulnerabilities and facilitating the long run growth and development of small states. Trade is the lifeblood of small economies and as such is a double-edged sword. Small countries must trade to survive, but at the same time greater integration in the global economy exposures them to external shocks. The quality of global insertion is what ultimately determines long term economic performance. To take account of this, the EVI for 2002 was augmented with an indicator of export product mix to capture the nature of the products traded and by extension the quality of countries' insertion in the global economy. This served to raise the overall value of the EVI.

9.02 Nine of CDB's borrowing member countries, including Haiti, are found among the top 20 most vulnerable countries and 12 are in the 36 most vulnerable. Shifts in rankings between the 2002 sample and the 1993/94 samples occurred randomly reflecting no systematic movement in country groups relative to each other. The general trend of SIDS and small states being more susceptible to economics shocks than non-small states was maintained. In contrast to the country groups, there were a few major rearrangements in the individual rankings. A changing trade structure, albeit increased export diversification or greater reliance on a single export or trading partner, accounted for the majority of shifts in the rankings of individual countries. Of particular interest to the Caribbean was Barbados which

moved down the rankings due to export diversification. Guyana's ranking also improved due to reduced peripherality, less dependence on external finance and a changing trade structure.

9.03 The experimentation with transformational or weighting alterations produced no substantial impact on the rankings or indices implying the EVI is robust in nature. Conversely, the validation tests produced less than satisfactory results suggesting that more appropriate validators have to be found, and/or more research is needed in correctly identifying the underlying causes of vulnerability.

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**COUNTRY GROUPINGS DEFINITION AND COUNTRY CLASSIFICATION**

Classification of each state was identical to the classification in Crowards (2000b) to allow for comparative analysis. The criteria for splitting the sample into groups of countries are listed in Box 1 while the countries comprising each group are shown in table below.

**Box 1: Splitting the Sample Into Groups of Countries (Crowards 2000b)**

**Micro States:** States with populations of up to around 250,000, or slightly higher depending upon land area and GDP. Of the 23 qualified countries, 14 are included in the study and two differed from those included in the 1993/94 Study.

**Small States:** States with populations of up to and around 2.5 million, but with wide variation depending upon land area and GDP. This includes the first two columns in the table below. Of the 51 such countries, 30 are included in the study and one differed from those included in the 1993/94 study.

**SIDS:** All small states that are islands. The list of countries in this group can be derived from the first two columns in the table. Of 43 such countries, 22 are included in the study and 1 differed from the 1993/94 study.

**Landlocked States:** The countries included in this group are distinguished in the table. Of 22 such countries, 13 were included in the study and 2 differed from the 1993/94 study.

**Non-small States:** All medium and large states were included. Of 85 such countries, 63 are included in the study and 7 differed from the 1993/94 study.

<b>Micro States</b>	<b>Other Small States</b>	<b>Intermediate States</b>	<b>Large States</b>
Anguilla*^	Bahamas*^	Bolivia <sup>L</sup>	Argentina
Antigua and Barbuda*^	Bahrain*	<i>Cambodia</i>	Bangladesh
Barbados*^	Belize ^	Congo	Brazil
Dominica*^	Burundi <sup>L</sup>	Costa Rica	Chile
Grenada*^	Cyprus*	Cote d'Ivoire	China
Maldives*	<i>Guinea-Bissau</i>	Czech Republic <sup>L</sup>	Colombia
Montserrat*^	Guyana ^	Dominican Republic*^	Egypt
<i>Netherland Antilles*^</i>	Haiti*^	Ecuador	India
<i>SaoTome and Principe*</i>	Jamaica*^	El Salvador	Indonesia
Seychelles*	Mauritius*	Ethiopia <sup>L</sup>	Korea, Republic of
St. Kitts and Nevis*^	Rwanda <sup>L</sup>	Ghana	Malaysia
St. Lucia*^	Sierra Leone	Guatemala	Mexico
St. Vincent and the Grenadines*^	Suriname ^	<i>Guinea</i>	Morocco
<i>Tonga*</i>	Togo	Honduras	Myanmar
Aruba*^	Trinidad and Tobago*^	Hungary <sup>L</sup>	Pakistan
Bermuda*^	<b>Bhutan<sup>L</sup></b>	Israel	Peru
<i>BVI*^</i>	Botswana <sup>L</sup>	Jordan <sup>L</sup>	Philippines
<i>Cayman Islands*^</i>	Cape Verde Islands*	Kenya	Poland
Comoros Islands*	Djibouti	<i>Kuwait</i>	Romania
Kiribati*	Equatorial Guinea	Madagascar	Saudi Arabia
<i>Malta*</i>	<i>Fiji*</i>	Malawi <sup>L</sup>	South Africa
Samoa*	French Guiana	<i>Mali<sup>L</sup></i>	Syria
Turks and Caicos Islands*^	Gambia	<i>Mongolia<sup>L</sup></i>	<i>Taiwan</i>
	Lesotho <sup>L</sup>	Mozambique	Thailand
	Qatar	Nepal <sup>L</sup>	Turkey
	Solomon Islands*	Nicaragua	Venezuela
	Swaziland <sup>L</sup>	Oman	<b>Algeria</b>
	<i>Vanuatu*</i>	Panama	<b>Iran</b>
		Paraguay <sup>L</sup>	<b>Nigeria</b>
		Senegal	Vietnam
		Singapore*	<b>Zaire (DRC)</b>
		Sri Lanka	
		Sudan	
		Tanzania	
		Tunisia	
		Uganda <sup>L</sup>	
		Uruguay	
		<i>Yemen</i>	
		<b>Benin</b>	
		<i>Burkina Faso<sup>L</sup></i>	
		<i>Cameroon</i>	

Micro States	Other Small States	Intermediate States	Large States
		Central African Republic <sup>L</sup> Chad <sup>L</sup> Cuba* Gabon Laos <sup>L</sup> Liberia <i>Mauritania</i> Namibia Niger <i>Papua New Guinea*</i> United Arab Emirates Zambia <sup>L</sup> <i>Zimbabwe<sup>L</sup></i>	

**Notes:** These country groupings were based on the grouping classification outlined in Crowards (2000b). Those countries for which insufficient information was available to be included in the final analysis for 2002 are in the shaded area in each column. The countries in italics in the shaded area are countries which were included in the 1993/94 sample while the countries in italics in the non-shaded area are countries which were not included in the 1993/94 sample. In other words, the italics indicated countries which differed between the two samples.

\* denotes **islands**

<sup>L</sup> denotes **landlocked**

<sup>^</sup> denotes **Caribbean**

**DATA SOURCES AND ISSUES**

<b>Number</b>	<b>Data Item</b>	<b>Source</b>
1	Ratio of Freight & Insurance Cost to Imports (c.i.f)	IMF Balance of Payment Statistics 2004, Part 3
2	Freight Cost	IMF Balance of Payment Statistics 2004, Part 2, Table 6
3	Imports (c.i.f)	UNCTAD, 2004 Table 4.2 (online database)
4	Imports (f.o.b)	IMF International Finance Statistics 2004
5	Services Exports	UNCTAD, 2004 Table 5.2 (online database)
6	Goods Exports	UNCTAD, 2004 Table 4.2 (online database)
7	2002 Total Goods Exports	IMF International Finance Statistics 2004
8	Destination of Exports	IMF Direction of Trade Statistics 2003
9	Total Destination Exports	IMF Direction of Trade Statistics 2003
10	GDP	World Bank World Development Indicators 2005 UNCTAD 2004, Table 7.1 (online database)
11	Official Domestic Assistance	UNCTAD 2004, Table 6.5 (online database) Organisation for Economic Cooperation and Development's Development Cooperative Directorate Aid Statistics
12	Foreign Direct Investment	UNCTAD 2004, Table 6.2 (online database)
13	Gross Capital Formation as a percentage of GDP	WB, WDI, 2004 Table 4.9 (online database)
14	Fuel Exports	UNCTAD, 2004 Table 4.1 (online database)
15	Fuel Imports	UNCTAD, 2004 Table 4.1 (online database)
16	Energy Dependence Indicators	United Nations Energy Statistics Yearbook 2003
17	Natural Disaster Indicators	School of Public Health at the Universite Catholique de Louvain's Center for Research on the Epidemiology of Disaster Emergency Event Database (EM-DAT) <a href="http://www.md.ucl.ac.be/cred">http://www.md.ucl.ac.be/cred</a>

**EXCEPTIONS**1. Freight Cost (Item No. 2)

- (a) Data for Fiji was obtained from the Fiji Islands Bureau of Statistics Balance of Payment Statistics – September 2005 (Table 7.3 International Trade in Services). Freight and insurance cost was calculated by summing the air transport freight cost, sea transport freight cost and freight insurance.

2. Imports (c.i.f)

- (a) Data for Congo, Cote d'Ivoire, El Salvador, Iran, Mali, Mauritania, Mauritius, Papua New Guinea, Philippines, Sudan, Togo and Uganda was obtained from the IMF International Finance Statistics 2004.

**3. Imports (f.o.b)**

- (a) Data for Fiji, Myanmar, Nepal, Oman, Tongo and Vanuatu was obtained from IMF Balance of Payment Statistics 2004, Part 1.
- (b) Data for Dominica was obtained from the Eastern Caribbean Central Bank (ECCB) Balance of Payment Statistics for year ending 2003.

**4. Services Exports**

- (a) 2003 Data for all the Eastern Caribbean Countries was obtained from the ECCB Balance of Payment Statistics for year ending 2003.
- (b) Data for Fiji was obtained from the Fiji Islands Bureau of Statistics Balance of Payment Statistics – September 2005 (Table 7.3 International Trade in Services).

**5. Destination of Exports**

- (a) Data for Montserrat, and Antigua and Barbuda was obtained from the Caribbean Development Bank. In 2002, the Less Developed Countries in the Caribbean Basin was considered a single export destination for Montserrat.
- (b) Data for Anguilla was obtained from the Anguilla Statistical Unit.

**6. Foreign Direct Investment**

- (a) 2003 data for Antigua and Barbuda, Anguilla, Bahamas and Montserrat was obtained from their respective Central Banks.
- (b) Data for Barbados was obtained from the Barbados Central Bank.
- (c) Data for Taiwan was obtained from the Republic of China's Directorate General of Budget, Accounting and Statistics.

**7. Fuel Imports**

- (a) Data for the Bahamas was obtained from its Central Bank.

**ISSUES****1. Peripherality**

- (a) Peripherality was proxied by the ratio of freight and insurance cost to imports (c.i.f). This ratio was determined using three methods. These were:
  - (i) This ratio was given in the explanation of methodologies, compilation practices and data sources of the IMF BOP Statistics 2004, Part 3. This provided the most reliable estimate. However, a ratio was not given for all countries requiring other estimation methods.

- (ii) In instances where the ratio was not given it was estimated using the freight cost as a percentage of imports (c.i.f). This causes a downward bias in the ratio as insurance cost was not accounted for in the calculations.
  - (iii) The final alternative for estimating the freight and insurance cost was using the difference between imports (f.o.b) and imports (c.i.f). Often, imports (f.o.b) information was difficult to obtain and produced questionable results in some cases (e.g. negative freight costs). Hence this estimation methodology was used as a last resort.
- (b) Freight cost often remains consistent between years. Thus, if there was only information to estimate a single year, this estimation was used for all years under consideration.
  - (c) Cape Verde ratio appeared extraordinarily high when the first estimation method was used. However, as the ratio could not be computed using method two due to a lack of data, and a negative value was derived using method three, this original questionable value was utilized in computing the EVI.
  - (d) Guyana ratio appeared exceptionally low. This value was calculated using the second method. Although Guyana's ratio, like Cape Verde, was questionable it was impossible to verify these ratios. Problems such as classification inconsistencies, lack of destination/source country details in published statistics and time lags in reporting data makes recording and verification a mountainous task. As a result, some reported statistics are questionable.

## 2. Export Concentration

- (a) The three export concentration variables were calculated in the following manner:
  - (i) Top Export is the ratio of the top goods or service export to the total exports of goods and services.
  - (ii) Top Three Exports is the ratio of the total of the top three goods and services exports to the total exports of goods and services.
  - (iii) Openness is the ratio of total exports of goods and services to GDP.
- (b) This methodology differed from Cowards (2000b) as it not only considered travel exports, but all service exports categories.
- (c) The top goods exports based on the three digit level of the SITC Revision 2 classification system were used.
- (d) The services exports were based on the most detailed categorization level of services. It was based on the eleven main categories according to the definition of the IMF BOP Manuel (BPM5, 2003).

3. Export Destination

- (a) The three export destination variables were calculated in the following manner:
  - (i) Top Export Destination is the ratio of the top export destination to the total exports of goods.
  - (ii) Top Three Export Destination is the ratio of the top three export destinations to the total exports of goods.
  - (iii) Openness is the ratio of total exports of goods and services to GDP.
- (b) Export destination, like Cowards (2000b), only accounted for goods exports. This was mainly due to an unavailability of information about service exports destination. Thus countries who are primarily service exporters will appear deceptively less vulnerable in their export destination convergence indicators.

4. Reliance upon External Finance/Capital

- (a) This consisted of two variables. These are:
  - (i) Official Development Assistance which was measured as a ratio of ODA funds to GCF.
  - (ii) Foreign Direct Investment which was measured as a ratio of FDI funds to GCF.
- (b) In the present revision Gross Capital Formation replaced Gross Fixed Capital Formation (Crowards 2000b) as the availability of GFCF was limited.

5. Susceptibility to Natural Disasters

- (a) This consisted of two variables which were:
  - (i) Cumulative number of deaths per capita caused by natural disasters between 1950 and 2002.
  - (ii) Cumulative number of people affected per capita caused by natural disasters between 1950 and 2002.
- (b) There is minimal loss of human life and substantial socioeconomic costs in the face of natural catastrophes in the Caribbean. Therefore, any index which considers only mortality will severely underestimate the developmental impact of natural disasters. Crowards (2000b)'s disaster susceptibility component suffers from this weakness as it does not incorporate a measure of economic cost. Thus, small islands developing states such as the Caribbean will appear to be more vulnerable with the exclusion of the natural disaster component, although the opposite is reflected in reality.

6. Energy Dependence

- (a) This consisted of a single variable which was calculated by taking the imports net of exports and changes in stocks as a ratio of total consumption, air and sea bunkers and unallocated quantities.

## INDICES OF TWO STAGE NORMALISED PARAMETERS FOR 2002

Country <sup>10</sup>	2002 EVI	1993 EVI	2002 EVR	1993 EVR	Perip. & Energy	Export Conc.	Export Dest.	External Finance	Natural Disasters
Montserrat	0.91	0.76	1	4	0.83	0.83	0.95	0.92	1.00
Cape Verde	0.76		2		0.98	0.76	0.84	0.94	0.31
Anguilla	0.76	0.85	3	1	0.83	1.00	0.91	0.75	0.34
St Lucia	0.74	0.76	4	3	0.83	0.88	0.85	0.68	0.45
Cambodia	0.73		5		0.74	0.81	0.91	0.76	0.44
Sao Tome & Prin	0.71		6		0.91	0.82	0.51	0.80	0.52
Neth. Antilles	0.70		7		0.57	0.98	0.57	0.46	0.93
Guinea-Bissau	0.70		8		0.91	0.58	0.82	0.80	0.38
Maldives	0.70	0.69	9	11	0.83	0.94	0.77	0.57	0.37
Dominica	0.69	0.67	10	17	0.79	0.68	0.66	0.79	0.53
St. Kitts and Nevis	0.67	0.73	11	7	0.83	0.65	0.91	0.65	0.34
Haiti	0.67	0.68	12	13	0.91	0.51	0.88	0.50	0.53
St. Vincent	0.67	0.63	13	22	0.81	0.78	0.63	0.64	0.48
Seychelles	0.65	0.64	14	19	0.87	0.68	0.89	0.57	0.24
Dominican Rep	0.65	0.63	15	20	0.79	0.51	0.97	0.57	0.41
Sierra Leone	0.65	0.68	16	14	0.83	0.62	0.57	1.00	0.24
Tonga	0.65		17		0.91	0.36	0.73	0.72	0.52
Belize	0.64	0.69	18	12	0.72	0.61	0.73	0.58	0.58
Antigua and Barbuda	0.64	0.74	19	5	0.83	0.93	0.37	0.55	0.52
Sudan	0.63	0.47	20	57	0.46	0.60	0.68	0.68	0.73
Mali	0.63		21		0.97	0.81	0.16	0.78	0.41
Mongolia	0.63		22		0.35	0.59	0.85	0.79	0.54
Mozambique	0.62	0.59	23	30	0.21	0.60	0.68	0.81	0.81
Honduras	0.61	0.67	24	16	0.68	0.36	0.69	0.64	0.67
Jamaica	0.61	0.70	25	9	0.87	0.72	0.51	0.54	0.41
Ethiopia	0.61	0.62	26	24	0.75	0.45	0.11	0.87	0.85
Rwanda	0.59	0.64	27	18	1.00	0.37	0.51	0.70	0.38
Malawi	0.59	0.63	28	21	0.73	0.69	0.21	0.77	0.54
Bahamas	0.58	0.60	29	29	0.77	0.82	0.70	0.49	0.14
Mauritius	0.56	0.57	30	34	0.71	0.54	0.71	0.44	0.39
Cyprus	0.56	0.48	31	53	0.79	0.76	0.46	0.61	0.17
Congo, Republic of	0.55	0.59	32	29	0.35	0.83	0.58	0.79	0.22
Madagascar	0.55	0.54	33	38	0.74	0.48	0.52	0.62	0.39
Grenada	0.55	0.61	34	27	0.83	0.80	0.26	0.68	0.17
Nicaragua	0.54	0.61	35	26	0.54	0.25	0.60	0.72	0.61
Guyana	0.54	0.71	36	8	0.48	0.52	0.69	0.68	0.35
Philippines	0.53	0.53	37	44	0.43	0.70	0.46	0.54	0.53
Sri Lanka	0.53	0.54	38	39	0.76	0.32	0.58	0.54	0.43
Panama	0.52	0.51	39	47	0.84	0.39	0.75	0.40	0.24
Ghana	0.52	0.52	40	45	0.70	0.64	0.21	0.66	0.38
Singapore	0.51	0.48	41	52	0.72	0.66	0.62	0.52	0.05
El Salvador	0.51	0.47	42	56	0.52	0.12	0.86	0.57	0.47
Togo	0.51	0.52	43	46	0.83	0.38	0.34	0.66	0.34
Nepal	0.51	0.58	44	32	0.64	0.32	0.69	0.47	0.40
Burundi	0.50	0.54	45	37	0.72	0.53	0.25	0.70	0.33

<sup>10</sup> 1999 Trade data was used for Antigua and Barbuda

INDICES OF TWO STAGE NORMALISED PARAMETERS FOR 2002

Country	2002 EVI	1993 EVI	2002 EVR	1993 EVR	Perip. & Energy	Export Conc.	Export Dest.	External Finance	Natural Disasters
Tanzania	0.50	0.47	46	55	0.72	0.48	0.18	0.79	0.34
Senegal	0.50	0.55	47	35	0.83	0.31	0.29	0.65	0.41
Venezuela	0.50	0.43	48	63	0.21	0.79	0.71	0.40	0.36
Guatemala	0.49	0.51	49	48	0.51	0.26	0.67	0.46	0.56
Morocco	0.49	0.49	50	51	0.67	0.42	0.54	0.53	0.28
Barbados	0.48	0.55	51	36	0.70	0.78	0.26	0.41	0.24
Uganda	0.48	0.54	52	40	0.66	0.41	0.31	0.76	0.25
Cote d'Ivoire	0.48	0.42	53	73	0.46	0.66	0.35	0.83	0.08
Israel	0.47	0.42	54	65	0.67	0.51	0.59	0.53	0.04
Yemen	0.46		55		0.28	0.87	0.37	0.63	0.15
Jordan	0.45	0.46	56	58	0.79	0.50	0.41	0.34	0.22
Bangladesh	0.45	0.54	57	41	0.39	0.30	0.30	0.42	0.84
Pakistan	0.44	0.34	58	82	0.41	0.29	0.12	0.64	0.75
Ecuador	0.44	0.47	59	54	0.16	0.54	0.51	0.57	0.40
Bahrain	0.43	0.35	60	79	0.25	0.94	0.30	0.55	0.10
Bolivia	0.43	0.44	61	61	0.13	0.35	0.36	0.89	0.39
Peru	0.42	0.39	62	71	0.33	0.30	0.28	0.60	0.61
Tunisia	0.41	0.41	63	66	0.20	0.41	0.63	0.61	0.22
Malaysia	0.41	0.38	64	74	0.23	0.56	0.58	0.48	0.18
Chile	0.41	0.41	65	67	0.55	0.44	0.24	0.34	0.46
Guinea	0.41		66		0.64	0.52	0.00	0.66	0.21
Oman	0.40	0.49	67	50	0.23	0.89	0.42	0.36	0.11
Thailand	0.40	0.39	68	69	0.53	0.28	0.39	0.41	0.38
Kenya	0.39	0.51	69	49	0.61	0.32	0.10	0.53	0.40
Kuwait	0.39		70		0.31	0.86	0.46	0.33	0.00
Colombia	0.39	0.37	71	76	0.13	0.30	0.55	0.57	0.40
Mexico	0.39	0.39	72	72	0.09	0.15	1.00	0.44	0.27
Syrian Arab Rep	0.39	0.39	73	70	0.31	0.77	0.29	0.41	0.16
Korea, Rep	0.39	0.29	74	87	0.47	0.23	0.35	0.24	0.64
Trinidad and Tobago	0.38	0.46	75	59	0.00	0.55	0.77	0.42	0.17
Czech Rep	0.37	0.48	76	89	0.27	0.23	0.63	0.60	0.12
Paraguay	0.35	0.45	77	60	0.13	0.35	0.62	0.42	0.24
India	0.35	0.35	78	80	0.37	0.19	0.09	0.41	0.69
Hungary	0.35	0.30	79	86	0.28	0.32	0.60	0.38	0.15
Costa Rica	0.34	0.58	80	33	0.41	0.43	0.07	0.48	0.33
Turkey	0.33	0.29	81	88	0.44	0.28	0.18	0.44	0.32
Suriname	0.33	0.40	82	68	0.17	0.95	0.49	0.00	0.05
China	0.33	0.35	83	78	0.09	0.07	0.38	0.45	0.65
Taiwan	0.32		84		0.50	0.32	0.25	0.33	0.22
Romania	0.32	0.25	85	91	0.22	0.17	0.41	0.54	0.25
Uruguay	0.30	0.42	86	64	0.47	0.29	0.21	0.42	0.12
Egypt	0.30	0.32	87	84	0.25	0.45	0.18	0.51	0.10
Saudi Arabia	0.29	0.32	88	83	0.18	0.88	0.34	0.03	0.05
Myanmar	0.29	0.26	89	90	0.21	0.33	0.29	0.42	0.21
Indonesia	0.29	0.35	90	81	0.20	0.23	0.34	0.40	0.26
Argentina	0.27	0.22	91	95	0.23	0.20	0.25	0.36	0.30
Poland	0.25	0.24	92	92	0.06	0.13	0.41	0.52	0.11
Brazil	0.23	0.23	93	94	0.12	0.00	0.19	0.50	0.32
South Africa	0.21	0.23	94	93	0.14	0.15	0.05	0.48	0.24

**RANKING OF TWO STAGE NORMALISED PARAMETERS FOR 2002**

<b>Country</b>	<b>EVI</b>	<b>EVR</b>	<b>Perip. &amp; Energy</b>	<b>Export Conc.</b>	<b>Export Dest.</b>	<b>External Finance</b>	<b>Natural Disasters</b>
Montserrat	0.91	1	12	12	3	3	1
Cape Verde	0.76	2	2	23	12	2	56
Anguilla	0.76	3	12	1	6	18	51
St Lucia	0.74	4	12	9	10	26	27
Cambodia	0.73	5	30	16	4	17	28
Sao Tome & Prin	0.71	6	4	15	45	9	21
Neth. Antilles	0.70	7	46	2	40	68	2
Guinea-Bissau	0.70	8	6	39	13	8	43
Maldives	0.70	9	12	5	14	43	45
Dominica	0.69	10	24	29	28	11	19
St Kitts and Nevis	0.67	11	12	32	5	31	50
Haiti	0.67	12	5	49	8	61	18
St Vincent	0.67	13	21	20	29	34	24
Seychelles	0.65	14	8	28	7	47	66
Dominican Rep	0.65	15	22	47	2	46	32
Sierra Leone	0.65	16	12	34	41	1	68
Tonga	0.65	17	7	64	18	20	23
Belize	0.64	18	32	35	17	41	14
Antigua and Barbuda	0.64	19	12	6	60	48	22
Sudan	0.63	20	57	37	25	24	7
Mali	0.63	21	3	17	87	14	31
Mongolia	0.63	22	64	38	11	10	16
Mozambique	0.62	23	79	36	26	7	5
Honduras	0.61	24	39	63	22	32	9
Jamaica	0.61	25	9	25	47	52	33
Ethiopia	0.61	26	28	54	89	5	3
Rwanda	0.59	27	1	62	48	21	44
Malawi	0.59	28	31	27	82	15	17
Bahamas	0.58	29	26	14	21	62	82
Mauritius	0.56	30	36	42	20	70	40
Cyprus	0.56	31	23	24	50	37	76
Congo, Republic of	0.55	32	65	13	39	12	72
Madagascar	0.55	33	29	51	44	36	39
Grenada	0.55	34	12	18	74	23	77
Nicaragua	0.54	35	48	82	35	19	12
Guyana	0.54	36	53	45	24	25	47
Philippines	0.53	37	59	26	51	50	20
Sri Lanka	0.53	38	27	69	38	51	29
Panama	0.52	39	10	60	16	84	64
Ghana	0.52	40	37	33	81	27	41
Singapore	0.51	41	34	30	33	58	90
El Salvador	0.51	42	50	92	9	42	25
Togo	0.51	43	11	61	66	28	49
Nepal	0.51	44	43	68	23	66	36
Burundi	0.50	45	35	44	78	22	53
Tanzania	0.50	46	33	52	86	13	48
Senegal	0.50	47	20	73	71	30	30

**RANKING OF TWO STAGE NORMALISED PARAMETERS FOR 2002**

<b>Country</b>	<b>EVI</b>	<b>EVR</b>	<b>Perip. &amp; Energy</b>	<b>Export Conc.</b>	<b>Export Dest.</b>	<b>External Finance</b>	<b>Natural Disasters</b>
Venezuela	0.50	48	80	19	19	83	46
Guatemala	0.49	49	51	81	27	67	15
Morocco	0.49	50	40	57	43	55	58
Barbados	0.48	51	38	21	75	78	67
Uganda	0.48	52	42	58	67	16	61
Cote d'Ivoire	0.48	53	56	31	62	6	89
Israel	0.47	54	41	48	36	56	93
Yemen	0.46	55	70	10	59	35	81
Jordan	0.45	56	25	50	55	88	71
Bangladesh	0.45	57	62	75	68	75	4
Pakistan	0.44	58	60	78	88	33	6
Ecuador	0.44	59	85	43	46	44	35
Bahrain	0.43	60	72	4	69	49	87
Bolivia	0.43	61	88	66	61	4	38
Peru	0.42	62	66	76	73	40	13
Tunisia	0.41	63	82	59	30	38	70
Malaysia	0.41	64	74	40	37	64	75
Chile	0.41	65	47	55	79	89	26
Guinea	0.41	66	44	46	94	29	73
Oman	0.40	67	76	7	53	86	85
Thailand	0.40	68	49	79	57	80	42
Kenya	0.39	69	45	70	90	54	34
Kuwait	0.39	70	67	11	52	90	94
Colombia	0.39	71	87	74	42	45	37
Mexico	0.39	72	91	89	1	71	59
Syrian Arab Rep	0.39	73	67	22	70	79	79
Korea, Rep	0.39	74	54	84	63	92	11
Trinidad and Tobago	0.38	75	94	41	15	73	78
Czech Rep	0.37	76	71	85	31	39	83
Paraguay	0.35	77	89	65	32	76	63
India	0.35	78	63	87	91	81	8
Hungary	0.35	79	69	72	34	85	80
Costa Rica	0.34	80	61	56	92	63	52
Turkey	0.33	81	58	80	85	72	54
Suriname	0.33	82	84	3	49	94	91
China	0.33	83	92	93	58	69	10
Taiwan	0.32	84	52	71	77	91	69
Romania	0.32	85	77	88	56	53	62
Uruguay	0.30	86	55	77	80	74	84
Egypt	0.30	87	72	53	84	59	88
Saudi Arabia	0.29	88	83	8	65	93	92
Myanmar	0.29	89	78	67	72	77	74
Indonesia	0.29	90	81	83	64	82	60
Argentina	0.27	91	74	86	76	87	57
Poland	0.25	92	93	91	54	57	86
Brazil	0.23	93	90	94	83	60	55
South Africa	0.21	94	86	90	93	65	65

**INDICES OF ONE STAGE NORMALISED PARAMETERS FOR 2002**

<b>Country</b>	<b>EVI</b>	<b>EVR</b>	<b>Perip. &amp; Energy</b>	<b>Export Conc.</b>	<b>Export Dest</b>	<b>External Finance</b>	<b>Natural Disasters</b>
Montserrat	0.80	1	0.81	0.71	0.71	0.75	1.00
Cape Verde	0.67	2	0.94	0.66	0.65	0.77	0.34
Anguilla	0.67	3	0.81	0.84	0.69	0.64	0.36
Neth. Antilles	0.66	4	0.58	0.83	0.50	0.44	0.93
St Lucia	0.66	5	0.81	0.75	0.66	0.59	0.47
Sao Tome & Prin	0.65	6	0.89	0.70	0.46	0.67	0.54
Cambodia	0.65	7	0.73	0.70	0.69	0.64	0.47
Maldives	0.63	8	0.81	0.79	0.61	0.52	0.39
Dominica	0.63	9	0.78	0.59	0.55	0.67	0.55
Guinea-Bissau	0.62	10	0.88	0.52	0.64	0.67	0.40
St Vincent	0.61	11	0.80	0.68	0.53	0.56	0.50
Haiti	0.61	12	0.89	0.47	0.67	0.47	0.55
Antigua and Barbuda	0.61	13	0.81	0.79	0.38	0.50	0.54
St Kitts and Nevis	0.60	14	0.81	0.57	0.69	0.57	0.36
Mali	0.60	15	0.94	0.70	0.26	0.66	0.44
Tonga	0.59	16	0.88	0.35	0.58	0.62	0.54
Belize	0.59	17	0.72	0.54	0.59	0.52	0.60
Ethiopia	0.59	18	0.74	0.42	0.23	0.72	0.86
Sierra Leone	0.59	19	0.81	0.55	0.49	0.81	0.27
Dominican Rep	0.58	20	0.78	0.47	0.72	0.52	0.43
Seychelles	0.58	21	0.85	0.60	0.68	0.51	0.27
Sudan	0.58	22	0.49	0.53	0.56	0.59	0.74
Jamaica	0.57	23	0.85	0.62	0.46	0.49	0.43
Mozambique	0.57	24	0.26	0.54	0.56	0.68	0.81
Honduras	0.57	25	0.68	0.35	0.57	0.56	0.68
Malawi	0.57	26	0.73	0.61	0.29	0.65	0.56
Mongolia	0.56	27	0.39	0.52	0.66	0.67	0.56
Rwanda	0.56	28	0.97	0.36	0.46	0.61	0.40
Bahamas	0.53	29	0.76	0.71	0.57	0.46	0.17
Mauritius	0.52	30	0.71	0.49	0.58	0.43	0.41
Madagascar	0.52	31	0.74	0.45	0.47	0.55	0.41
Cyprus	0.52	32	0.78	0.65	0.43	0.54	0.20
Grenada	0.52	33	0.81	0.69	0.32	0.59	0.20
Nicaragua	0.52	34	0.56	0.27	0.51	0.62	0.63
Philippines	0.51	35	0.46	0.61	0.43	0.50	0.55
Ghana	0.51	36	0.70	0.56	0.29	0.58	0.41
Sri Lanka	0.50	37	0.75	0.32	0.50	0.50	0.45
Congo, Republic of	0.50	38	0.39	0.71	0.50	0.67	0.25
Guyana	0.50	39	0.50	0.48	0.56	0.59	0.38
Togo	0.50	40	0.82	0.36	0.36	0.58	0.37
Senegal	0.49	41	0.81	0.31	0.34	0.57	0.44
Panama	0.49	42	0.82	0.37	0.60	0.40	0.27
Tanzania	0.49	43	0.72	0.44	0.27	0.66	0.37
Burundi	0.49	44	0.71	0.48	0.31	0.60	0.35
Nepal	0.48	45	0.65	0.32	0.56	0.45	0.42

**INDICES OF ONE STAGE NORMALISED PARAMETERS FOR 2002**

<b>Country</b>	<b>EVI</b>	<b>EVR</b>	<b>Perip. &amp; Energy</b>	<b>Export Conc.</b>	<b>Export Dest</b>	<b>External Finance</b>	<b>Natural Disasters</b>
Singapore	0.48	46	0.72	0.58	0.52	0.48	0.09
El Salvador	0.48	47	0.54	0.17	0.66	0.52	0.49
Guatemala	0.48	48	0.53	0.28	0.55	0.44	0.57
Barbados	0.47	49	0.70	0.67	0.32	0.41	0.27
Morocco	0.47	50	0.67	0.40	0.48	0.49	0.31
Bangladesh	0.47	51	0.42	0.31	0.34	0.42	0.85
Uganda	0.46	52	0.66	0.39	0.34	0.65	0.28
Venezuela	0.46	53	0.26	0.68	0.58	0.40	0.39
Pakistan	0.46	54	0.44	0.30	0.24	0.56	0.76
Jordan	0.45	55	0.78	0.46	0.40	0.36	0.25
Cote d'Ivoire	0.45	56	0.49	0.58	0.37	0.69	0.12
Israel	0.44	57	0.67	0.47	0.51	0.49	0.08
Yemen	0.44	58	0.32	0.75	0.38	0.56	0.18
Peru	0.43	59	0.37	0.30	0.33	0.54	0.62
Chile	0.43	60	0.57	0.41	0.31	0.36	0.48
Ecuador	0.42	61	0.22	0.49	0.46	0.52	0.42
Guinea	0.42	62	0.65	0.47	0.17	0.58	0.24
Kenya	0.42	63	0.62	0.32	0.22	0.49	0.43
Bahrain	0.41	64	0.30	0.80	0.34	0.50	0.14
Korea, Rep	0.41	65	0.50	0.25	0.37	0.29	0.66
Bolivia	0.41	66	0.19	0.35	0.37	0.74	0.42
Thailand	0.41	67	0.55	0.29	0.39	0.41	0.40
Oman	0.39	68	0.28	0.76	0.41	0.38	0.15
Tunisia	0.39	69	0.25	0.39	0.53	0.54	0.25
Syrian Arab Rep	0.39	70	0.35	0.66	0.34	0.41	0.19
Malaysia	0.39	71	0.28	0.50	0.50	0.45	0.21
India	0.39	72	0.41	0.22	0.22	0.41	0.70
Colombia	0.38	73	0.19	0.31	0.49	0.52	0.42
Kuwait	0.38	74	0.35	0.74	0.43	0.35	0.04
Costa Rica	0.37	75	0.44	0.40	0.21	0.45	0.35
Mexico	0.36	76	0.16	0.19	0.74	0.43	0.30
Turkey	0.36	77	0.47	0.29	0.27	0.43	0.35
Trinidad and Tobago	0.36	78	0.07	0.50	0.61	0.42	0.20
Czech Rep	0.36	79	0.31	0.25	0.53	0.54	0.16
China	0.35	80	0.15	0.13	0.39	0.43	0.67
Taiwan	0.35	81	0.52	0.32	0.31	0.35	0.25
Paraguay	0.35	82	0.19	0.35	0.53	0.41	0.27
Hungary	0.35	83	0.32	0.32	0.51	0.39	0.18
Suriname	0.34	84	0.22	0.80	0.45	0.13	0.08
Uruguay	0.33	85	0.49	0.30	0.29	0.42	0.16
Romania	0.33	86	0.27	0.20	0.40	0.49	0.28
Egypt	0.32	87	0.30	0.42	0.27	0.48	0.14
Myanmar	0.32	88	0.26	0.33	0.34	0.41	0.24
Saudi Arabia	0.31	89	0.23	0.75	0.36	0.15	0.08
Indonesia	0.31	90	0.25	0.25	0.36	0.40	0.29
Argentina	0.30	91	0.28	0.23	0.31	0.37	0.33
Brazil	0.27	92	0.18	0.08	0.28	0.47	0.34
Poland	0.27	93	0.13	0.18	0.40	0.48	0.15
South Africa	0.26	94	0.20	0.19	0.20	0.45	0.27

**RANKINGS OF ONE STAGE NORMALISED PARAMETERS FOR 2002**

<b>Country</b>	<b>EVI</b>	<b>EVR</b>	<b>Perip. &amp; Energy</b>	<b>Export Conc.</b>	<b>Export Dest</b>	<b>External Finance</b>	<b>Natural Disasters</b>
Montserrat	0.80	1	12	12	3	3	1
Cape Verde	0.67	2	2	23	12	2	56
Anguilla	0.67	3	12	1	6	18	51
Neth. Antilles	0.66	4	46	2	40	68	2
St. Lucia	0.66	5	12	9	10	26	27
Sao Tome & Prin	0.65	6	4	15	45	9	21
Cambodia	0.65	7	30	16	4	17	28
Maldives	0.63	8	12	5	14	43	45
Dominica	0.63	9	24	29	28	11	19
Guinea-Bissau	0.62	10	6	39	13	8	43
St Vincent	0.61	11	21	20	29	34	24
Haiti	0.61	12	5	49	8	61	18
Antigua and Barbuda	0.61	13	12	6	60	48	22
St. Kitts and Nevis	0.60	14	12	32	5	31	50
Mali	0.60	15	3	17	87	14	31
Tonga	0.59	16	7	64	18	20	23
Belize	0.59	17	32	35	17	41	14
Ethiopia	0.59	18	28	54	89	5	3
Sierra Leone	0.59	19	12	34	41	1	68
Dominican Rep	0.58	20	22	47	2	46	32
Seychelles	0.58	21	8	28	7	47	66
Sudan	0.58	22	57	37	25	24	7
Jamaica	0.57	23	9	25	47	52	33
Mozambique	0.57	24	79	36	26	7	5
Honduras	0.57	25	39	63	22	32	9
Malawi	0.57	26	31	27	82	15	17
Mongolia	0.56	27	64	38	11	10	16
Rwanda	0.56	28	1	62	48	21	44
Bahamas	0.53	29	26	14	21	62	82
Mauritius	0.52	30	36	42	20	70	40
Madagascar	0.52	31	29	51	44	36	39
Cyprus	0.52	32	23	24	50	37	76
Grenada	0.52	33	12	18	74	23	77
Nicaragua	0.52	34	48	82	35	19	12
Philippines	0.51	35	59	26	51	50	20
Ghana	0.51	36	37	33	81	27	41
Sri Lanka	0.50	37	27	69	38	51	29
Congo, Republic of	0.50	38	65	13	39	12	72
Guyana	0.50	39	53	45	24	25	47
Togo	0.50	40	11	61	66	28	49
Senegal	0.49	41	20	73	71	30	30
Panama	0.49	42	10	60	16	84	64
Tanzania	0.49	43	33	52	86	13	48
Burundi	0.49	44	35	44	78	22	53
Nepal	0.48	45	43	68	23	66	36
Singapore	0.48	46	34	30	33	58	90
El Salvador	0.48	47	50	92	9	42	25
Guatemala	0.48	48	51	81	27	67	15
Barbados	0.47	49	38	21	75	78	67
Morocco	0.47	50	40	57	43	55	58
Bangladesh	0.47	51	62	75	68	75	4

**RANKINGS OF ONE STAGE NORMALISED PARAMETERS FOR 2002**

<b>Country</b>	<b>EVI</b>	<b>EVR</b>	<b>Perip. &amp; Energy</b>	<b>Export Conc.</b>	<b>Export Dest</b>	<b>External Finance</b>	<b>Natural Disasters</b>
Uganda	0.46	52	42	58	67	16	61
Venezuela	0.46	53	80	19	19	83	46
Pakistan	0.46	54	60	78	88	33	6
Jordan	0.45	55	25	50	55	88	71
Cote d'Ivoire	0.45	56	56	31	62	6	89
Israel	0.44	57	41	48	36	56	93
Yemen	0.44	58	70	10	59	35	81
Peru	0.43	59	66	76	73	40	13
Chile	0.43	60	47	55	79	89	26
Ecuador	0.42	61	85	43	46	44	35
Guinea	0.42	62	44	46	94	29	73
Kenya	0.42	63	45	70	90	54	34
Bahrain	0.41	64	72	4	69	49	87
Korea, Rep	0.41	65	54	84	63	92	11
Bolivia	0.41	66	88	66	61	4	38
Thailand	0.41	67	49	79	57	80	42
Oman	0.39	68	76	7	53	86	85
Tunisia	0.39	69	82	59	30	38	70
Syrian Arab Rep	0.39	70	67	22	70	79	79
Malaysia	0.39	71	74	40	37	64	75
India	0.39	72	63	87	91	81	8
Colombia	0.38	73	87	74	42	45	37
Kuwait	0.38	74	67	11	52	90	94
Costa Rica	0.37	75	61	56	92	63	52
Mexico	0.36	76	91	89	1	71	59
Turkey	0.36	77	58	80	85	72	54
Trinidad and Tobago	0.36	78	94	41	15	73	78
Czech Rep	0.36	79	71	85	31	39	83
China	0.35	80	92	93	58	69	10
Taiwan	0.35	81	52	71	77	91	69
Paraguay	0.35	82	89	65	32	76	63
Hungary	0.35	83	69	72	34	85	80
Suriname	0.34	84	84	3	49	94	91
Uruguay	0.33	85	55	77	80	74	84
Romania	0.33	86	77	88	56	53	62
Egypt	0.32	87	72	53	84	59	88
Myanmar	0.32	88	78	67	72	77	74
Saudi Arabia	0.31	89	83	8	65	93	92
Indonesia	0.31	90	81	83	64	82	60
Argentina	0.30	91	74	86	76	87	57
Brazil	0.27	92	90	94	83	60	55
Poland	0.27	93	93	91	54	57	86
South Africa	0.26	94	86	90	93	65	65

**2002 SENSITIVITY ANALYSIS OF CARIBBEAN COUNTRIES**

**2002 SENSITIVITY ANALYSIS<sup>11</sup> OF INDICES**

<b>Country</b>	<b>1993/94 EVI</b>	<b>2002 Original EVI</b>	<b>Peripherality/ Energy</b>	<b>Export Conc</b>	<b>Export Dest</b>	<b>External Finance</b>	<b>Natural Disasters</b>	<b>Peripheral</b>	<b>Energy</b>	<b>Separation of Peripheral and Energy</b>	<b>Quality of Insertion</b>
Anguilla	0.85	0.76	0.75	0.70	0.73	0.77	0.87	0.78	0.73	0.77	0.80
Antigua and Barbuda	0.74	0.64	0.60	0.57	0.71	0.66	0.67	0.64	0.60	0.67	0.69
Bahamas	0.60	0.58	0.54	0.53	0.56	0.61	0.70	0.59	0.54	0.61	0.66
Barbados	0.55	0.48	0.42	0.40	0.53	0.49	0.54	0.47	0.44	0.52	0.55
Belize	0.69	0.64	0.63	0.65	0.62	0.66	0.66	0.66	0.61	0.66	0.67
Dominica	0.67	0.69	0.66	0.69	0.70	0.66	0.73	0.69	0.66	0.70	0.71
Dominican Rep	0.63	0.65	0.62	0.68	0.57	0.67	0.71	0.66	0.61	0.67	0.69
Grenada	0.61	0.55	0.48	0.48	0.62	0.51	0.64	0.53	0.49	0.59	0.62
Guyana	0.71	0.54	0.56	0.55	0.51	0.51	0.59	0.61	0.50	0.54	0.59
Haiti	0.68	0.67	0.61	0.71	0.62	0.71	0.70	0.65	0.63	0.70	0.64
Jamaica	0.70	0.61	0.54	0.58	0.63	0.62	0.66	0.59	0.56	0.65	0.67
Montserrat	0.76	0.91	0.92	0.92	0.89	0.90	0.88	0.93	0.89	0.89	0.86
Neth. Antilles		0.70	0.74	0.63	0.74	0.76	0.65	0.76	0.67	0.68	0.70
St Kitts and Nevis	0.73	0.67	0.64	0.68	0.61	0.68	0.76	0.68	0.63	0.69	0.69
St Lucia	0.76	0.74	0.71	0.70	0.71	0.75	0.81	0.75	0.70	0.75	0.76
St Vincent	0.63	0.67	0.63	0.64	0.68	0.68	0.72	0.67	0.63	0.69	0.70
Suriname	0.40	0.33	0.37	0.18	0.29	0.41	0.40	0.34	0.36	0.32	0.39
Trinidad and Tobago	0.46	0.38	0.48	0.34	0.29	0.37	0.44	0.42	0.44	0.34	0.35
Caribbean Countries	0.64	0.62	0.60	0.59	0.61	0.63	0.67	0.66	0.59	0.63	0.65
All Countries	0.50	0.50	0.49	0.49	0.50	0.48	0.53	0.51	0.49	0.51	0.51

<sup>11</sup> Sensitivity Analysis modifications involved the removal of the listed component from the EVI calculation. The only exception is the Separation of Peripherality and Energy which treated the Peripherality and Energy indicators as separate components.

**2002 SENSITIVITY ANALYSIS OF RANKINGS<sup>12</sup>**

<b>Country</b>	<b>1993/94 EVR</b>	<b>2002 Original EVR</b>	<b>Peripherality/ Energy</b>	<b>Export Conc</b>	<b>Export Dest</b>	<b>External Finance</b>	<b>Natural Disasters</b>	<b>Peripheral</b>	<b>Energy</b>	<b>Separation of Peripheral and Energy</b>	<b>Quality of Insertion</b>
Anguilla	1	3	2	7	6	2	3	2	2	3	2
Antigua and Barbuda	5	19	21	31	9	15	19	18	22	19	13
Bahamas	29	29	31	40	33	21	15	26	30	25	21
Barbados	36	51	65	67	40	44	43	52	62	49	40
Belize	12	18	16	15	19	17	20	13	20	20	17
Dominica	17	10	11	9	10	16	12	9	13	9	8
Dominican Rep	20	15	17	11	31	13	14	14	18	17	15
Grenada	27	34	45	49	20	39	26	36	42	30	26
Guyana	8	36	27	38	46	38	33	23	39	41	31
Haiti	13	12	22	6	24	8	16	20	17	11	22
Jamaica	9	25	33	28	17	19	21	27	29	21	20
Montserrat	4	1	1	1	1	1	1	1	1	1	1
Neth. Antilles		7	3	23	5	3	23	3	10	13	12
St Kitts and Nevis	7	11	14	12	21	10	9	11	14	10	14
St Lucia	3	4	6	8	8	4	4	5	4	4	4
St Vincent	22	13	15	19	14	12	13	12	15	12	10
Suriname	68	82	77	93	84	59	71	83	77	84	71
Trinidad and Tobago	59	75	44	78	85	72	67	64	67	81	80
Caribbean Countries	17	22	25	36	28	22	23	23	29	25	23
All Countries	48	48	48	48	48	48	48	48	48	48	48

<sup>12</sup> Sensitivity Analysis modifications involved the removal of the listed component from the EVI calculation. The only exception is the Separation of Peripherality and Energy which treated the Peripherality and Energy indicators as separate components.

**APPENDIX 8**

**INDICES AND RANKINGS WITH 2002 QUALITY OF INSERTION COMPONENT**

<b>Countries</b>	<b>EVI</b>	<b>EVR</b>	<b>Peripherality Index</b>	<b>Energy Index</b>	<b>Quality of Insertion Index</b>	<b>Peripherality Rank</b>	<b>Energy Rank</b>	<b>Quality of Insertion Rank</b>
Anguilla	0.80	2	0.62	1.00	0.95	20	1	3
Antigua and Barbuda	0.69	13	0.62	1.00	0.86	20	1	8
Argentina	0.32	85	0.56	0.00	0.58	38	74	44
Bahamas	0.66	21	0.53	1.00	0.93	51	1	4
Bahrain	0.46	57	0.59	0.00	0.73	32	74	23
Bangladesh	0.39	72	0.55	0.28	0.01	48	62	93
Barbados	0.55	40	0.59	0.81	0.77	32	44	18
Belize	0.67	17	0.46	0.97	0.78	60	26	16
Bolivia	0.41	64	0.38	0.00	0.51	71	74	55
Brazil	0.25	94	0.17	0.19	0.37	87	68	73
Burundi	0.52	48	0.56	0.87	0.39	38	42	70
Cambodia	0.70	11	0.48	0.98	0.53	55	25	51
Cape Verde	0.78	3	0.89	1.00	0.72	4	1	28
Chile	0.48	54	0.34	0.79	0.72	75	46	24
China	0.30	89	0.28	0.03	0.24	84	72	83
Colombia	0.36	79	0.38	0.00	0.33	70	74	77
Congo, Republic of	0.53	44	0.78	0.00	0.53	7	74	52
Costa Rica	0.40	69	0.33	0.54	0.64	79	58	38
Cote d'Ivoire	0.53	46	0.76	0.22	0.79	11	67	14
Cyprus	0.61	28	0.56	1.00	0.72	38	1	25
Czech Rep	0.38	74	0.33	0.29	0.46	78	61	65
Dominica	0.71	8	0.62	0.93	0.76	20	34	20
Dominican Rep	0.69	15	0.57	0.99	0.78	36	23	17
Ecuador	0.43	62	0.43	0.00	0.55	64	74	47
Egypt	0.32	87	0.59	0.00	0.38	32	74	72
El Salvador	0.51	50	0.41	0.67	0.46	67	53	64
Ethiopia	0.60	30	0.57	0.92	0.43	37	35	67
Ghana	0.57	35	0.62	0.78	0.68	20	47	35
Grenada	0.62	26	0.62	1.00	0.79	20	1	15
Guatemala	0.50	51	0.47	0.59	0.51	58	56	54
Guinea	0.47	56	0.38	0.91	0.59	72	36	43
Guinea-Bissau	0.76	5	0.77	1.00	0.96	8	1	2
Guyana	0.59	31	0.00	1.00	0.92	94	1	5
Haiti	0.64	22	0.82	0.95	0.29	5	30	78
Honduras	0.63	24	0.47	0.89	0.66	59	40	36
Hungary	0.37	76	0.07	0.58	0.52	93	57	53
India	0.34	84	0.56	0.25	0.16	38	65	89
Indonesia	0.32	86	0.50	0.00	0.49	54	74	58
Israel	0.47	55	0.34	0.99	0.26	76	21	82
Jamaica	0.67	20	0.71	1.00	0.79	12	20	12
Jordan	0.53	47	0.59	0.96	0.66	32	29	37
Kenya	0.44	59	0.44	0.80	0.48	62	45	62
Korea, Rep	0.38	75	0.16	0.83	0.20	89	43	87
Kuwait	0.34	82	0.71	0.00	0.05	12	74	92
Madagascar	0.57	36	0.53	0.94	0.48	49	31	61
Malawi	0.63	25	0.68	0.77	0.72	16	49	26
Malaysia	0.44	60	0.56	0.00	0.69	38	74	32
Maldives	0.75	6	0.62	1.00	1.00	20	1	1
Mali	0.68	16	0.97	0.91	0.74	3	37	21
Mauritius	0.60	29	0.43	0.99	0.72	65	22	27
Mexico	0.34	83	0.31	0.00	0.21	81	74	85

**INDICES AND RANKINGS WITH 2002 QUALITY OF INSERTION COMPONENT**

<b>Countries</b>	<b>EVI</b>	<b>EVR</b>	<b>Peripherality Index</b>	<b>Energy Index</b>	<b>Quality of Insertion Index</b>	<b>Peripherality Rank</b>	<b>Energy Rank</b>	<b>Quality of Insertion Rank</b>
Mongolia	0.63	23	0.56	0.22	0.84	38	66	9
Montserrat	0.86	1	0.62	1.00	0.70	20	1	29
Morocco	0.53	45	0.36	0.99	0.57	74	24	45
Mozambique	0.58	33	0.52	0.00	0.63	52	73	39
Myanmar	0.28	90	0.53	0.00	0.21	50	74	84
Nepal	0.48	53	0.39	0.90	0.20	69	38	88
Neth. Antilles	0.70	12	0.17	1.00	0.79	88	1	13
Nicaragua	0.57	34	0.42	0.69	0.69	66	52	31
Oman	0.38	73	0.56	0.00	0.35	47	74	75
Pakistan	0.40	68	0.48	0.39	0.14	55	60	91
Panama	0.59	32	0.77	0.87	0.70	8	41	30
Paraguay	0.39	70	0.38	0.00	0.73	73	74	22
Peru	0.43	61	0.48	0.27	0.50	57	63	57
Philippines	0.50	52	0.27	0.65	0.35	85	55	74
Poland	0.25	92	0.12	0.13	0.34	92	71	76
Romania	0.31	88	0.28	0.26	0.27	83	64	81
Rwanda	0.62	27	1.00	0.93	0.43	1	33	68
Sao Tome & Prin	0.74	7	0.81	0.97	0.77	6	27	19
Saudi Arabia	0.25	93	0.46	0.00	0.00	61	74	94
Senegal	0.54	42	0.62	1.00	0.47	20	18	63
Seychelles	0.71	9	0.71	1.00	0.86	12	1	6
Sierra Leone	0.67	19	0.62	1.00	0.63	20	1	40
Singapore	0.57	37	0.43	1.00	0.69	63	1	33
South Africa	0.26	91	0.40	0.00	0.50	68	74	56
Sri Lanka	0.55	41	0.56	0.94	0.45	38	32	66
St Kitts and Nevis	0.69	14	0.62	1.00	0.68	20	1	34
St Lucia	0.76	4	0.62	1.00	0.86	20	1	7
St Vincent	0.70	10	0.62	0.97	0.81	20	27	10
Sudan	0.56	38	0.97	0.00	0.29	2	74	79
Suriname	0.39	71	0.31	0.13	0.79	82	70	11
Syrian Arab Rep	0.40	67	0.71	0.00	0.48	12	74	59
Taiwan	0.35	81	0.14	0.90	0.28	91	39	80
Tanzania	0.54	43	0.65	0.78	0.54	17	48	50
Thailand	0.45	58	0.56	0.54	0.61	38	59	41
Togo	0.56	39	0.64	1.00	0.55	19	19	46
Tonga	0.67	18	0.77	1.00	0.60	10	1	42
Trinidad and Tobago	0.35	80	0.15	0.00	0.39	90	74	71
Tunisia	0.41	66	0.34	0.16	0.48	77	69	60
Turkey	0.37	78	0.18	0.75	0.42	86	51	69
Uganda	0.51	49	0.56	0.77	0.54	38	50	49
Uruguay	0.37	77	0.32	0.66	0.54	80	54	48
Venezuela	0.42	63	0.52	0.00	0.16	53	74	90
Yemen	0.41	65	0.65	0.00	0.21	18	74	86