Transition Probability Matrices, Revealed Comparative Advantage Persistence and the Dutch Disease in a small oil-based economy

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Objective

- To explore persistence in RCA in Trinidad and Tobago over the period 1991 – 2008

- To analyze the pattern of exports in Trinidad and Tobago

- To explore how the Dutch Disease syndrome has affected the pattern of exports.

- Associated policy recommendations

Revealed Comparative Advantage

- Balassa (1965) suggested that comparative advantage could be "revealed" by observed trade patterns that reflect differences in factor endowments across nations.

- Measuring RCA using the Balassa Index – the most widely used index in the literature

- Calculating the average index for 91 – 93 and 06-08

Balassa Index

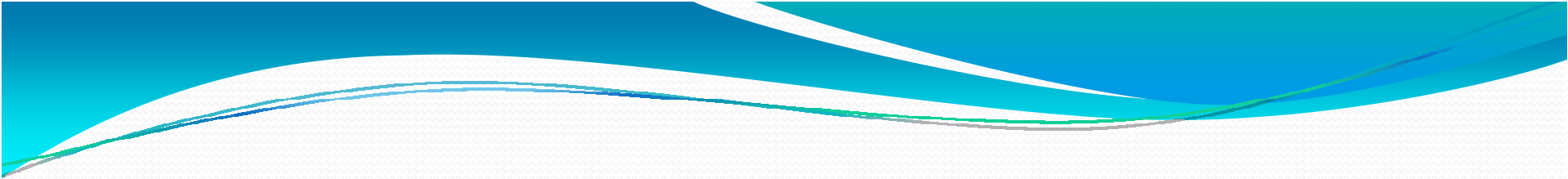$$RCA_{ij} = (X_{ij} / X_{it}) / (X_{nj} / X_{nt})$$

Where:

X = exports

i = country index
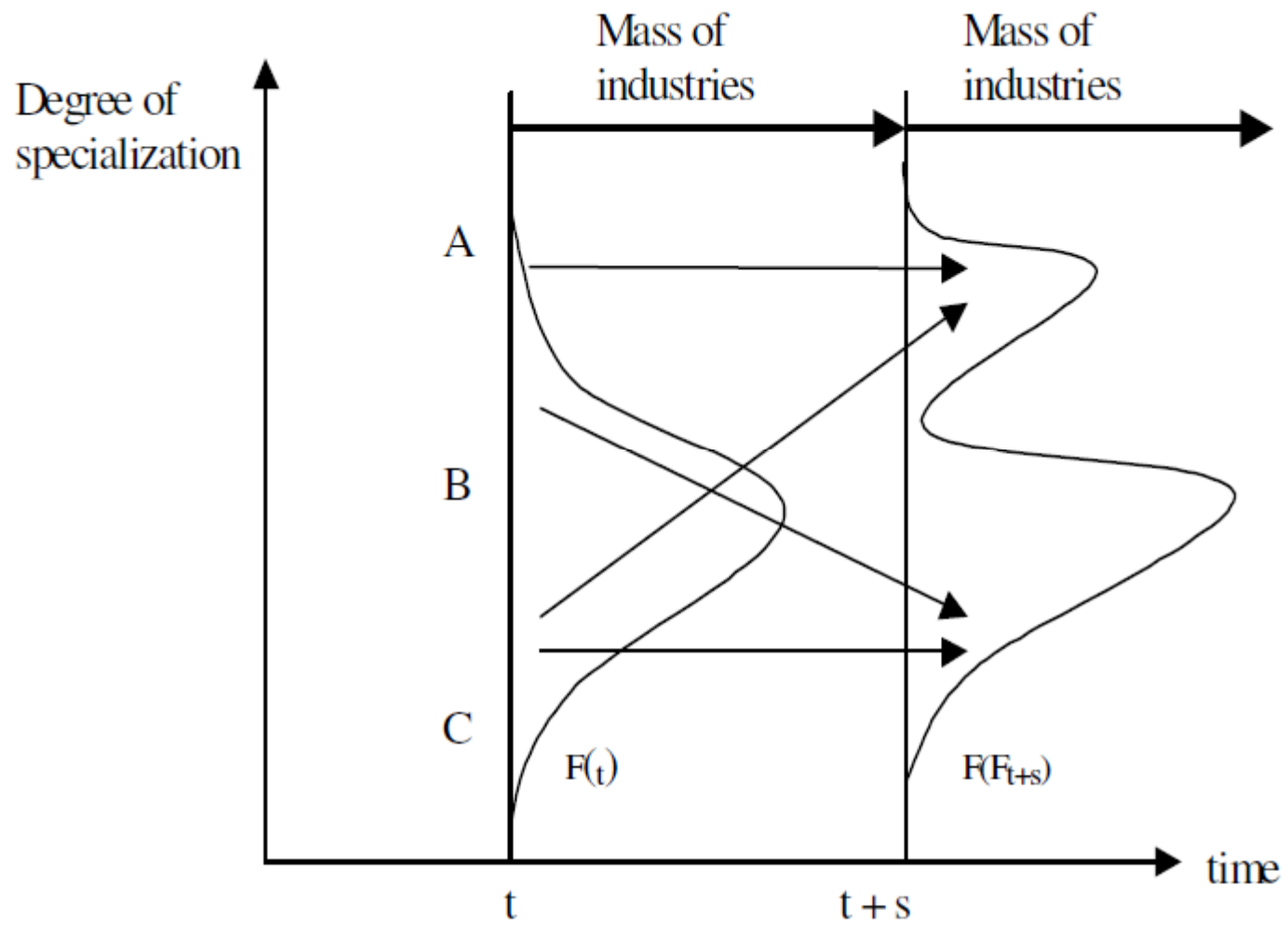
j = commodity index

n = set of countries

t = set of commodities

State	Value of Balassa Index	Result
State A	0 – 1	Industries with comparative disadvantage
State B	1 – 2	Industries with weak comparative advantage
State C	2 – 4	Industries with medium comparative advantage
State D	Greater than 4	Industries with strong comparative advantage

No of Industries with RCA > 1 (91-08)
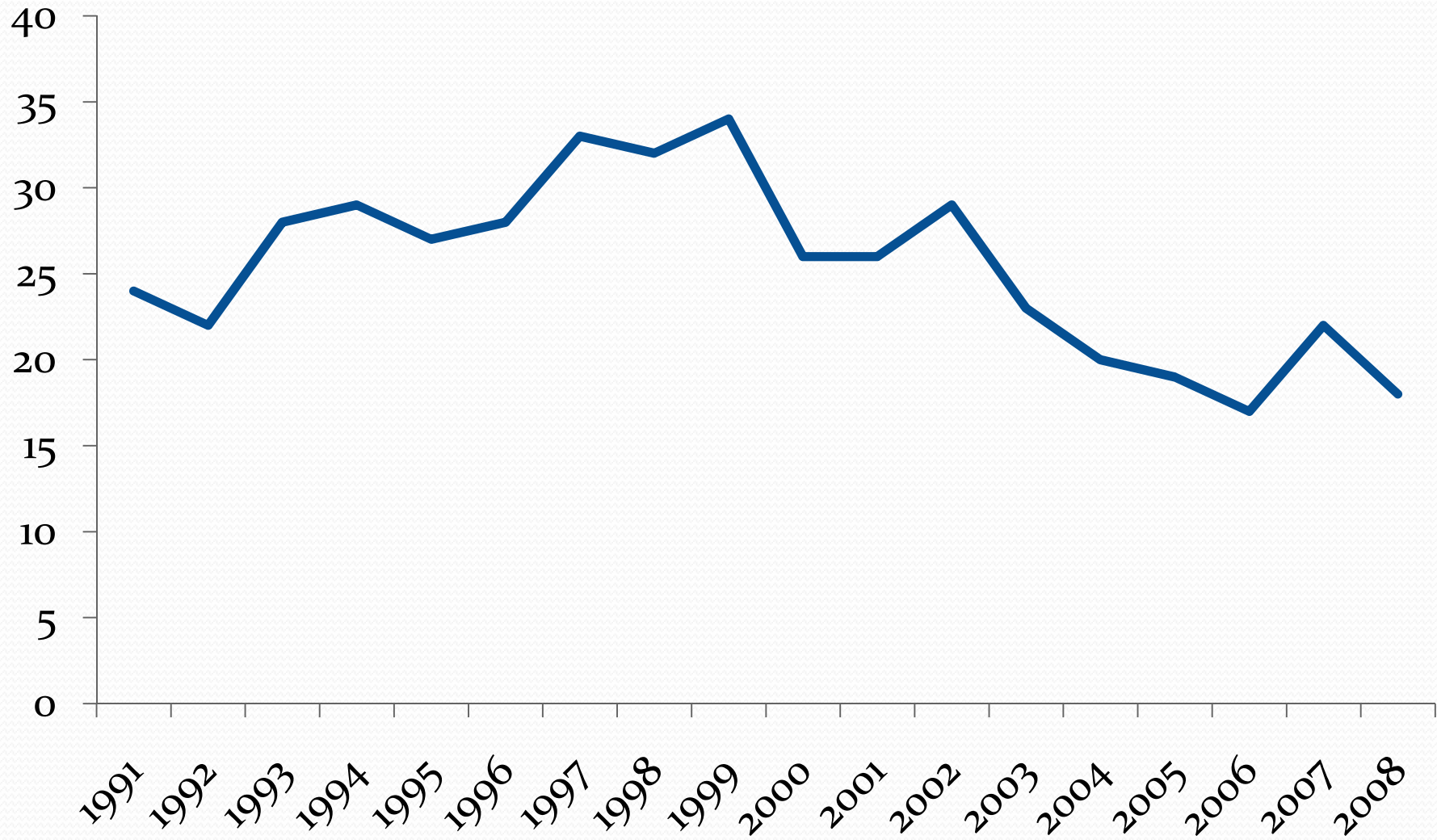
RCA: Average 91 -93
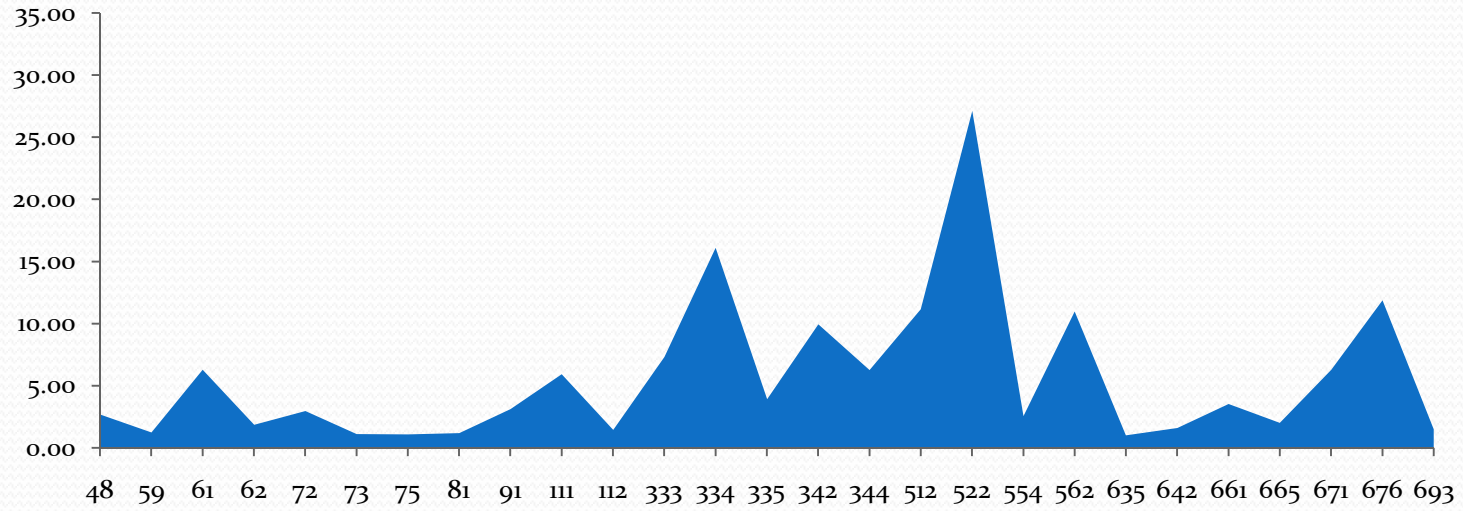
RCA: Average 06-08
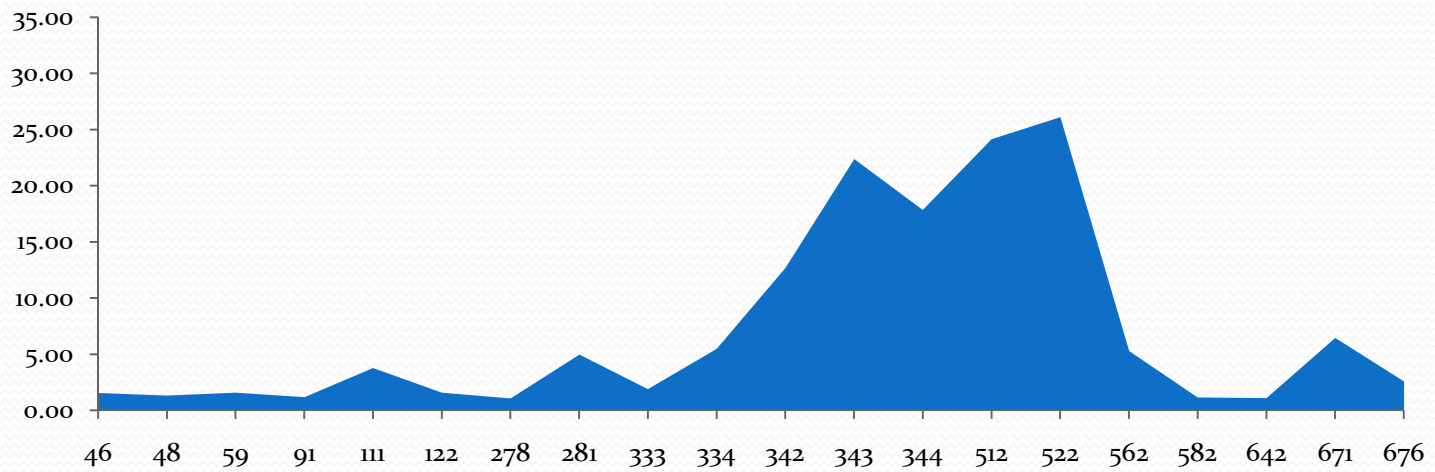
	RCA91_93	RCA06_08
Mean	0.665046	0.628195
Median	0.028490	0.015216
Maximum	27.13540	26.12518
Minimum	0.000000	0.000000
Std. Dev.	2.549074	3.007380
Skewness	6.552863	6.795862
Kurtosis	55.78771	51.00832
Jarque-Bera	31678.49	26658.75
Probability	0.000000	0.000000
Observations	257	257

Galtonian Regression

- $RCA_{t2} = \alpha_0 + \beta_1 RCA_{t1} + e_{t2}$

- $\beta = 1$: there is no change in the degree of specialization between the two time periods.

- $\beta > 1$: the economy has become more specialized in its area of comparative advantage and less specialized in product categories in which it carried a low level of specialization.

- $0 < \beta < 1$: product categories with initially high values of RCA experience a decline between the listed time periods whilst those with initially low scores experience growth over time and so overall a β score in this range indicates that the specialization pattern has not changed.

- If $\beta < 0$, it means that there is a sharp reversal in comparative advantage.

Dependent Variable: RCA06_08
Included observations: 257

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RCA91_93	1.238186	0.051994	16.12086	0.0000
C	0.070763	0.136723	0.517567	0.6052

R-squared	0.504741	Mean dependent var		0.628195
Adjusted R-squared	0.502799	S.D. dependent var		3.007380
S.E. of regression	2.120578	Akaike info criterion		4.349007
Sum squared resid	1146.697	Schwarz criterion		4.376626
Log likelihood	-556.8473	Hannan-Quinn criter.		4.360114
F-statistic	259.8823	Durbin-Watson stat		1.232204
Prob(F-statistic)	0.000000			

Wald Test

- Is $\beta = 1.23$ significantly different from 1?

| Test Statistic	Value	df	Probability
F-statistic	6.267875	(1, 255)	0.0052
Chi-square	6.267875	1	0.0048

Markov Chains and Transition Probability Matrix

- A Markov Chain may be simply defined as a sequence of random values whose probability values at time period t hinge on the value of the number in the time interval t-1.

- A transition probability matrix is defined as a square array of non negative numbers such that the rows tally to unity and represent a discrete Markov chain.

Markov Chains and Transition Probability Matrix

<div align="center">

To

	a	**b**	**c**	**d**
a	0.974	0.017	0.000	0.009
b	0.778	0.222	0.000	0.000
c	0.714	0.286	0.000	0.000
d	0.091	0.091	0.182	0.636

</div>

From

$R^2 = 0.5276$

REER

Real Oil Prices
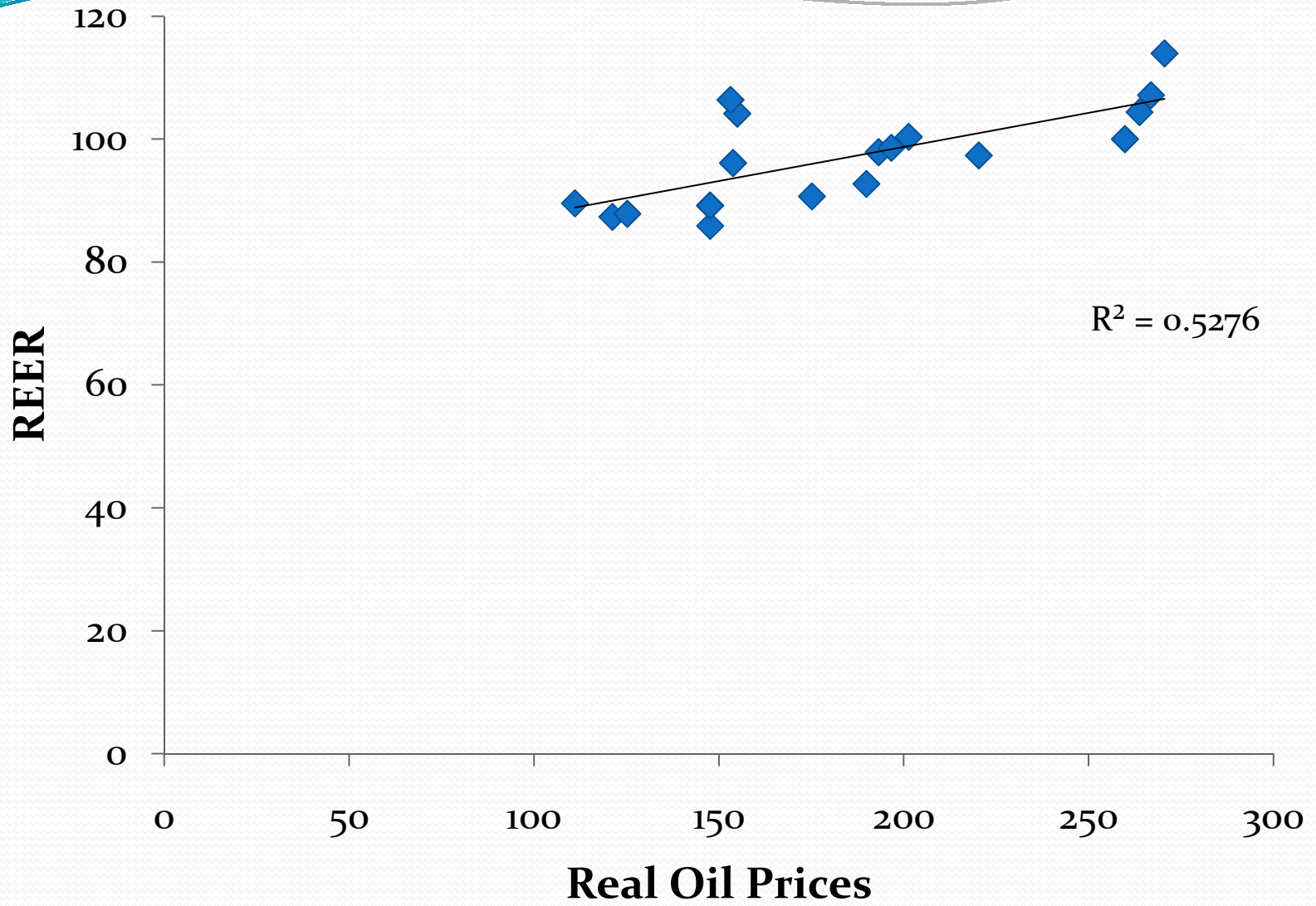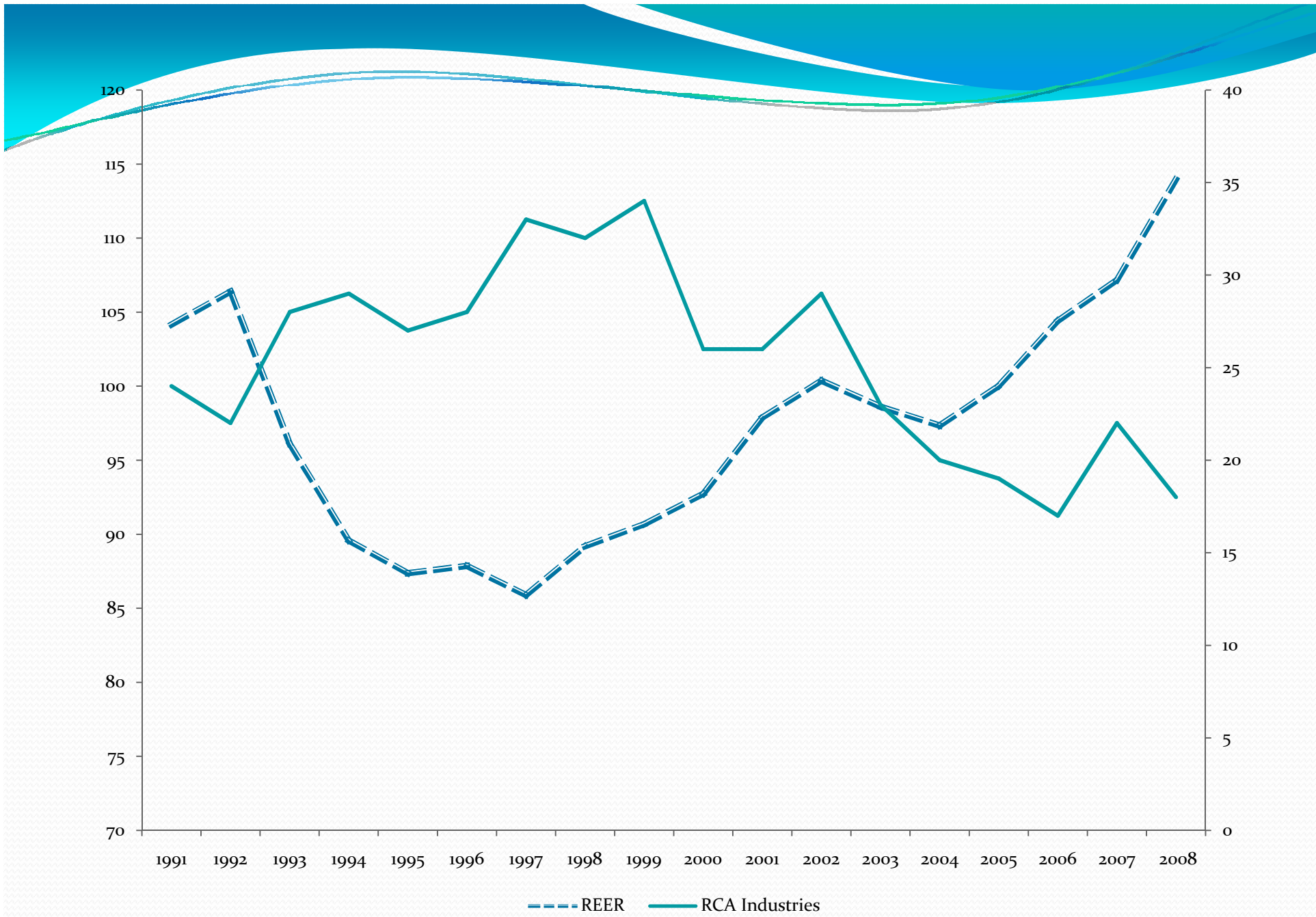
Mobility Indices

- Mobility indices attempts to reduce information about mobility from the transition probability matrices into one single statistic.

Mobility Index	Formula
Shorrocks Index (M_1)	$M_1 = K\text{-}tr(P)/K\text{-}1$
Bartholomew Index (M_2)	$M_2 = \Sigma_k \pi_k \Sigma_l p_{kl} \left| k\text{-}1 \right|$
Shorrocks Index (M_3)	$M_3 = 1 - \det(P)$
Sommers and Conlisk (M_4)	$M_4 = 1 - \lambda_2$

M4

Period	M4
91 - 92	0.167
91 - 93	0.010
91 - 94	0.182
91 - 95	0.021
91 - 96	0.065
91 - 97	0.196
91 - 98	0.032
91 - 99	0.073
91 - 00	0.069
91 - 01	0.135
91 - 02	0.179
91 - 03	0.183
91 - 04	0.188
91 - 05	0.188
91 - 06	0.280
91 - 07	0.287
91 - 08	0.377

REER vs. Share of Agriculture Exports

REER   Share of Agriculture Exports

REER vs. Manufacturing Exports
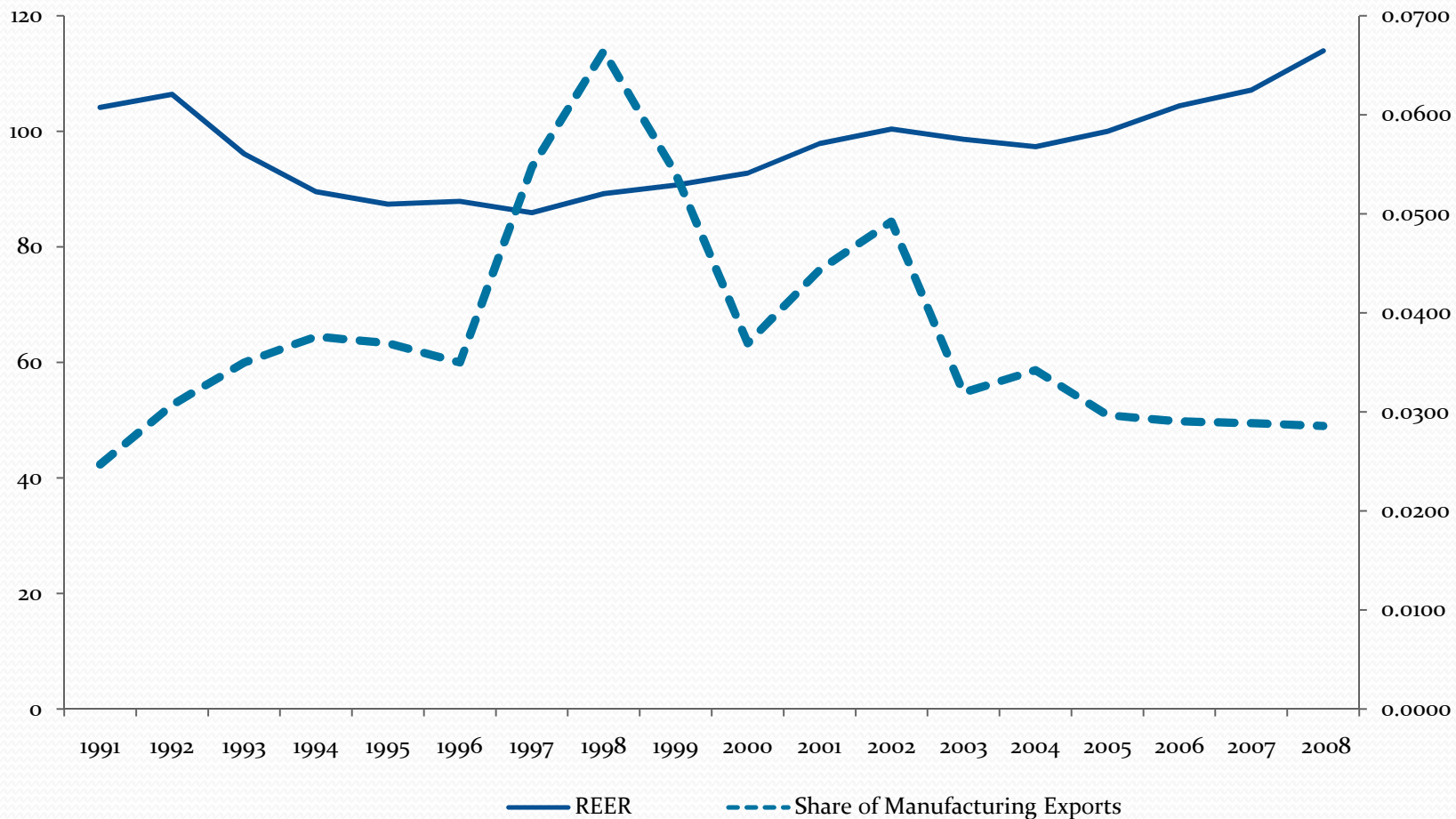
Granger Causality

Granger Causality Test #1			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
Real Oil Prices does not Granger Cause RCA Industries	16	3.64525	0.041
RCA Industries does not Granger Cause Real Oil Prices		2.01752	0.1793
Granger Causality Test #2			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
REER does not Granger Cause M4	16	0.74092	0.499
M4 does not Granger Cause REER		10.8825	0.0025
Granger Causality Test #3			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
RCA Industries does not Granger Cause M4	16	2.07216	0.0723
M4 does not Granger Cause RCA Industries		1.48528	0.2685

Conclusion and Recommendations

- Shift in the pattern of specialization from the period 1991-93 to 06-08.

- Industries with weak comparative advantage have a high probability of moving towards being a position of a comparative disadvantage. This shows that there is mobility in pattern of trade.

- Dutch Disease phenomenon is very present in Trinidad and Tobago for the period 1991 - 2008

- Enact further policies to promote diversification of the economy so as to ensure that there is greater persistence in comparative advantage

Conclusion and Recommendations

- Put in place policies that promote competitiveness in manufacturing and services sectors so as to increase the value added within these sectors

- Continued development of the human capital of the country

- Create a culture of innovation and research and development