The Exchange Rate-Inflation Link: The Experience of Some Caribbean and Central American Countries

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Using quarterly data for a group of eleven Caribbean and Central American countries the paper conducts an empirical examination of the Purchasing Power Parity. After a Unit Root Test establishes the non-stationarity of almost all variables, the paper employs the Johanssen Cointegration technique, to investigate the existence of a stable long term relationship between current inflation differentials and the bilateral nominal exchange rate for each country, and four of the major industrial nations. The results are generally strong, with cointegration being confirmed in most cases. The implication of this result is that developing countries that implement policies to promote low and stable inflation levels gain increased leverage over their exchange rate.

INTRODUCTION

In the twilight of the Caribbean Basin Initiative and with the impending arrival of the American Free Trade Area in the early 1990's, most Caribbean and Central American nations undertook various economic liberalization policies. These included elements of the following: the acceptance of the concept of privatization of public companies; the relaxation of restrictions on imports; the creation of export processing zones; the right of repatriation of profits for foreign firms; the liberalization of agricultural marketing boards; and perhaps most important was the move to more flexible exchange rates, please see Linde (1995).

Although these policies were generally implemented without popular support, they did bring about some generally positive results. However there was no replication of the boost in macroeconomic fundamentals that produced the burst of sustained growth that had resulted 25 years earlier when several East Asian countries implemented similar economic reforms. Within the region there has been an on going debate about the effectiveness of exchange rate variation as a policy tool for promoting economic growth and stability (Cardemil, Di Tata and Frantischek 2000). One aspect of that debate centers on the strength and reliability of the link between national price differentials and the nominal exchange rate, i.e. the Purchasing Power Parity (PPP) theory.

In the history of economic theory, the Purchasing Power Parity (PPP) hypothesis ranks among the most debated and investigated of all hypotheses. At its core, it is quite straight forward. If one accepts the Law of One Price, it is reasonable to postulate that price differentials between two countries should determine the exchange rate between these two countries. This is summarized below in Equation 1:

$$S_t = \alpha + \beta_1 P_t + \beta_2 P^* + W_t \qquad \text{Equation 1}$$

Where S_t is the nominal exchange rate
P_t is the domestic price level
P* is the foreign price level

In turn this implies that starting from equilibrium; a real exchange variation should result in off-setting trade flows that would ultimately lead the exchange rate back to a level consistent with the PPP.

Alternatively, since arbitrage in the goods market is expected to result in the equivalence of national prices, then the exchange rate must be such as to equate national prices. In a survey of PPP literature, Sarno and Taylor (2002) noted that for the most part empirical investigation based on the traditional Least Square regression model failed to confirm the PPP hypothesis. Frenkel (1978, 1981) is perhaps the most prominent of the writers whose empirical work finds no support for the PPP in the short run due chiefly to temporary real shocks (such as the steep increases in oil prices in the 1970's), while confirming the PPP as a tool for modeling the exchange rate in the long run.

The PPP is thought to a better fit for the economies of developing countries where generally higher inflation rates mean that economic shocks are mostly monetary in nature; for an example see Liu (1992). Additionally the majority of these studies did not delve into the stochastic properties of the residuals from a formulation such as Equation 1, leaving open the possibility that both the national price levels and the nominal exchange rate are in fact stationary variables.

In this a case Engle and Granger (1987) have shown that such a regression (in the absence of remediation techniques) could yield spurious results. However that path-breaking paper, Engle and Granger did demonstrate that if (in our case) the exchange rate and the two price levels could be shown to be non-stationary, then a linear combination (for example their residual in a simple Ordinary Least Squares regression) might be stationary. In that case these variables would be "cointegrated", implying the existence of an underlying long term relationship between them.

In this paper, data from eleven Caribbean and Central American (CCA) and countries with varying inflation experiences will be employed to test the PPP Hypothesis. In particular, an attempt will be made to discern whether there is a greater likelihood of an underlying long term relationship between nominal exchange rates and price levels for high than for low inflation countries.

This paper departs from previous research in three ways. First, the country group selected includes some very small developing countries, for which very few studies on the PPP have employed the Unit Root and Cointegration methods. Second, to conduct the above empirical analyses other studies have used bilateral exchange rates between the country in question and another country such as the US. The present research utilizes the bilateral exchange rate and the relevant price variables for each CCA country and each of the world's four major industrial trading partners in a version of Equation 1. This maximizes the opportunity to gain a vista into the process of inflation transmission. Finally, in another iteration of Equation 1, each country's

SDR exchange rate is used, with the "foreign price" being an unweighted composite inflation variable that is created from the four developed countries' individual price variables.

The paper is organized as follows: The next section provides some relevant background data on the inflation experience and the trading pattern of these eleven countries, as well as a description of the main data used in the study. This is followed by an exposition of the Stationarity and Cointegration tests used in this paper. An analysis of the empirical findings of these two tests follows. After a brief examination of the normalized cointegration coefficients and their implications, a concluding section synthesizes the paper's primary findings.

DATA DESCRIPTION

Table 1 reports the bi-directional trade patterns of the eleven CCA countries in the study. A few generalizations can be quickly made. First, almost all of these countries run trade deficits for all of the reported years. Apart from El Salvador (1970) and Costa Rica (2000), the only exception is Trinidad and Tobago from 1980 onward[1]. Second, even where it had not done so at the start of the study period, by 2000 the US had emerged as the primary trading partner of all eleven countries, in fact accounting for as much as two thirds of all foreign trade by Belize and St. Kitts.

Table 1

A corollary of this observation is the gradual diminution in the percentage of these nations' trade with the other four industrialized countries, with the exception being Japan whose trade share has remained fairly stable. By contrast Britain has experienced a significant secular decline in its trade with the region. It is true that Britain never accounted for a sizeable share of the trade of the mainland, Spanish-speaking republics. Beyond this, Table 1 clearly shows that Britain which had been the chief trading partner with the Caribbean islands and Belize during colonial times, had not only fallen behind the US in its share of trade, but was often struggling to rank higher than the other two developed countries. The country-specific direction of trade statistics presented in this table provides the rationale for using the bilateral exchange rate in the PPP formulation for this paper.

Table 2

The inflation picture for these countries is also mixed. As Table 2, indicates three countries: Belize, Panama and St. Kitts (coincidentally among the smallest) had the lowest rates, while Costa Rica, Jamaica and Nicaragua experienced the highest rates. Another interesting observation is that while the average annual inflation rates of the last 10 years are roughly similar to those over the forty three year study period for the high inflation countries (the notable exception being Nicaragua) the low inflation countries experienced notably lower inflation over the last 10 years (except for St. Kitts whose inflation barely fell). Since the premise of this paper is that the PPP Theory works best in high inflation situations, this clear distinction of long run inflationary patterns should provide a background for evaluating the empirical results.

The data used in the Unit Root and Cointegration test are quarterly and come from the International Financial Statistics (IFS) Data Bank. For each CCA country and developed country, the nominal exchange rate is measured by the number of domestic currency units that exchange for one unit of the SDR, and the consumer price index is as reported by the IMF's International Financial Statistics. Next an unweighted composite developed country price

variable is calculated for the four developed countries mentioned. This is used as an alternative "foreign price" variable in a formulation such as Equation 1.

THEORETICAL MODELS

Test for Stationarity

Let Y_t be a stochastic time series where its current value depends on its value one period earlier, together with a disturbance term as follows:

$$Y_t = \rho Y_{t-1} + u_t \qquad \text{Equation 2}$$

If $|\rho| < 1$, then the series Y_t is stationary and will fluctuate around its mean value within a constant range. However if the absolute value of ρ equals 1, the series is said to be non-stationary with both a mean that changes constantly through time, and a variance that increases to match increases in the chosen sample size. A straight forward test for stationarity is to regress the series on its one period lagged value. If the estimated value for ρ is 1, then the series has a unit root and is confirmed to be non-stationary.

This is the idea behind the simple Dickey-Fuller Test; see Dickey and Fuller (1979). An easily testable version of Equation 2 is found by modifying Equation 2 to obtain:

$$\Delta Y_t = \delta Y_{t-1} + u_t \qquad \text{Equation 3}$$

where $\delta = (\rho - 1)$, and where δ becomes 0 if $\rho = 1$.

In Equation 3, it is assumed that the disturbance term u_t is uncorrelated at higher order lags and thus represents "white noise." In fact auto-correlated disturbance terms would nullify the Dickey-Fuller Test. This problem is easily solved by augmenting Equation 3 with lagged values of the series ΔY_t to the right hand side to obtain:

$$\Delta Y_t = \beta_0 + \delta Y_{t-1} + \alpha_i \Delta Y_{t-1} + u_t \qquad \text{Equation 4}$$

This is the Augmented Dickey Fuller Test (ADF) in which we still test whether $\delta = 0$.

Test for Cointegration

As set out by Engle and Granger (1987), if two variables Y and X are shown to contain a unit root and are both I(1), then we can regress Y on X, such as:

$$Y_t = \beta_0 + \beta_i X_t + u \qquad \text{Equation 5}$$

Now writing out this equation with the residual as the dependent variable yields:

$$u_t = Y_t - \beta_0 - \beta_1 X_t \qquad \text{Equation 6}$$

If a unit root test establishes that u is stationary, i.e.: I (0) and is free of stochastic trends, this allows us to state that Y and X are cointegrated, implying that there is a long term relationship between them. Johansen and Juselius (1990) and Johansen (1991) extended this to a dynamic multivariate system which could incorporate a range of deterministic components. Regression

analysis based on Equation 6 gives an economically meaningful representation of the long term relationship between the variables. In general for the Cointegration Test we hypothesize that the level data (Y_t) above have linear trends but that the cointegrating equations merely have intercepts (i.e. no linear trends).

EMPIRICAL RESULTS

Ordinary Least Squares Test

As a prelude to implementing the Unit Root and Cointegration tests, Table 3 provides results for each CCA country for an Ordinary Least Squares (OLS) regression of Equation 1. In this table the dependent variable used is the log of each country's SDR exchange rate, and the two independent variables are LPD (the log of the country's domestic price level) and LPW (log of the composite developed country price level) which stands for the foreign price level.

Table 3

For the most part the OLS results shown in Table 3 provide support to the symmetry and proportionality conditions of the PPP Hypothesis[2]. In general the domestic inflation variable for the CCA countries has the expected positive sign, while the developed country inflation variable is mostly negative, with almost universally significant T-Statistics being reported. One curious result is that the incorrect signs are for the three countries with the lowest recorded annual inflation rates, a fact that might provide an early hint of the weakness of the PPP Hypothesis in low inflation conditions.

A related observation is the fact that as the OLS Test progresses to higher inflation countries there is a noticeable rise in the Coefficient of Determination (R^2). In every case the Durbin-Watson Statistic is in the range indicating the presence of first order autocorrelation with the accompanying possibility that the estimated regression might be spurious.

Unit Root Test

Table 4 presents the stationarity test for each CCA country for the bilateral exchange rate and the domestic price variables. Specifically for each country we first present the log of that country's bilateral exchange rate at the level (e.g. LBXUS for the US), and that at first difference (e.g. DLBXUS) with each of the US, the UK, France and Japan. Similarly Table 5 presents the level and the first difference unit root coefficients on the domestic price level, the composite price variable (mentioned earlier), and the SDR variable.

Table 4 and 5

Here we estimate the ADF using a constant and employ a Schwartz Information Criterion automatic lag length selection where the maximum is set at 4. The null hypothesis in both level and first difference form is the existence of a unit root[3]. For the countries in Table 4 the ADF statistic for the level test absolutely exceeds the critical value at the 5% level in all cases and even the 1% level in most cases, meaning that we cannot reject the null hypothesis. The critical values are -3.47, -2.88, and -2.58 at the 1%, 5%, and 10% levels respectively.

As the reverse is true for all variables for the first difference test it can be definitively concluded that each variable is nonsingular, possessing one root. The unit root test on the selected variables for the developed countries in Table 5 also yields strong support for non-singularity with the level test for the Japan price level and the first difference test for the

composite price variable being the only borderline results. All of this evidence points to the possibility of the validity of the long run PPP theory, and highlights the need to test for cointegration to explore further the nature of the long run relationship between the price level and the nominal exchange rate differential.

Cointegration Test Results

Tables 6 and 7 report the Trace and Maximum Eigen Value (MEV) results for the Johansen Cointegration Test. For each country the test utilized the bilateral exchange rate between that CCA country and the relevant developed country, together with the CCA country's and the developed country's price level. The result of each such country pairing is reported under each bilateral exchange rate. In addition each country's SDR exchange rate and its price level is used, with the composite developed country price index serving as the foreign price. In other words for each CCA country, each of the five exchange rate variables reported in these two tables provides the results for a separate Cointegration Test that follows Equation 1.

The second column lists the number of possible cointegrating equations, followed by the Trace or MEV statistics, and the actual number of cointegrating relations found. The corresponding 5 percent critical value for at most 0,1, and 2 cointegrating vectors are 29.78, 15.49 and 3.84 respectively for the Trace Test and 21.3, 14.26 and 3.84 for the Maximum Eigen Value test.

In general the results for the SDR exchange rate variable (i.e. looking only at the first column in both tables and using the composite developed country price as the foreign price variable) decisively reject the null hypothesis of no conintegrating relations, more so in the case of the Trace test. In fact in only one country, Panama, does the Trace deny this possibility while the less liberal Maximum Eigen Value test does so in four cases Belize, Panama, Guatemala and Honduras. It is noteworthy that the first two countries are in the low inflation group and the next two in the middle group.

The Trace test reports multiple cointegrating relations for Costa Rica, Honduras and Trinidad and Tobago (two each) and El Salvador and Barbados (three each), while the MEV test confirms the finding of multiple relations in only one case, Costa Rica (two). Using the SDR from Tables 6 and 7, we are able to confirm the existence of an underlying long run relationship between the variables in Equation 1. There is nevertheless only mixed support for our initial hypothesis of a greater likelihood for such a relationship the higher a country's rate of inflation (refer to Table 3 for the annual rate of domestic price increases for the eleven CCA countries over the forty three year span).

Continuing the analysis of the results from Tables 6 and 7, we now turn to the cointegration test between the bilateral exchange rate between each of the four developed countries and the CCA countries, this time using each CCA country and developed country price level. For the most part the MEV, and to a larger extent the Trace test rejects the hypothesis that there are at most 0 cointegrating relations between each panel country's bilateral exchange rate with each of the four developed countries and the price level for the two countries in question.

For the Trace test, the eleven cases in which the hypothesis of no cointegrating relations is accepted all occur in the low or middle inflation group. Although the MEV test is not quite as definitive as the Trace test, still eighteen of its twenty two cases of accepting the null occur in the low to mid inflation CCA countries. Additionally while the Trace test is replete with findings of multiple cointegrating relations, the MEV Test reports only five cases. Interestingly, three of the five cases are in the high inflation group. However, one such occurrence comes from using the

bilateral exchange rate between the US and Belize, which happens to be the CCA country with the lowest rate of inflation.

The last two columns of Table 8 report the normalized cointegration coefficients for the CCA and developed country price variables[4]. These are normalized to make the coefficients on the exchange rate variable equal to 1. To support the PPP Hypothesis these coefficients should equal -1 and 1 respectively. In the case of seven of these countries (Panama, Guatemala, Honduras, El Salvador, Costa Rica, Jamaica and Nicaragua) the signs are correct, but are mixed (at least one incorrect sign) in the other four countries.

Also for the six countries with the largest annual domestic inflation, the values are reasonably close to -1 and 1 except for the developed country price variable in Nicaragua, Jamaica and Costa Rica. For the low inflation countries there is no case of a pair of normalized coefficients where both are reasonably close to the expected PPP absolute values. This also amounts to somewhat mixed evidence in support of the idea that the long run PPP works best in countries experiencing high annual rates of inflation.

Overall the empirical work provides somewhat mixed support for the PPP hypothesis, with the Trace test being more clear-cut in that support than is the Maximum Eigen Value test. There is equally qualified support for our initial hypothesis of a greater likelihood for such a relationship the higher a country's rate of inflation (refer to Table 2 for the annual rate of domestic price increases for the eleven CCA countries over the forty three year span). The first finding is in line with the relatively few studies done on the experience of Developing Countries with the PPP. Lui (1992) and Nagaayasu (2002) uncovered a stronger link between inflation differentials and the exchange rate in their work on Latin American and African countries respectively, perhaps because both country groups had average annual inflation rates that, at over 25 %, were considerably higher than the CCA countries under study.

However qualified, the establishment of national price differentials as a determinant of exchange rates is important because of its policy implications for these countries. First the PPP estimated exchange rate is now generally accepted by multilateral agencies such as the IMF as a reliable yardstick for a nation's fundamental real exchange rate; please see Edwards (1988 and1998) and Machlup (1972) for an extended discussion of this topic. The PPP construct in turn serves as a dependable indicator of nominal exchange rate misalignment and the required remedial policies. Second, as both the Caribbean and Central American nations become more tightly integrated inside their respective regional trading blocks[5] and contemplate some form of monetary union, the PPP will provide a more reliable framework for setting exchange rate parities and for comparing national income levels inside such blocks.

CONCLUSION

This paper used Unit Root and Cointegration Tests to evaluate the PPP hypothesis of a link between the price differentials of two countries and the nominal exchange rate between these two countries. Data were used on eleven Caribbean and Central American countries which had varying experiences with inflation over the forty three year study period. The analysis differs from previous studies in that in addition to using the SDR exchange rate with the two price variables, it employs, for each CCA3 country, the bilateral exchange rate with each of the four developed countries in the study.

While a preliminary OLS analysis suggests that price differentials are important in explaining nominal exchange rates for these countries, the possibility that some of these variables might be

stationary calls into question the reliability of these results. In examining the stochastic properties of these variables the paper produced mixed results. It was established that just about all variables used in this paper possessed a unit root, and for most countries there is at least one cointegrating relationship when the SDR exchange variable is used.

This pattern holds up for the most part when the country-specific bilateral exchange rate is substituted with the appropriate price variables. This constitutes some support for the long run PPP. An attempt to examine the symmetry and proportionality conditions of the PPP Hypothesis proved far more ambiguous with almost half of the countries exhibiting normalization coefficients either with the wrong sign or being noticeably different from 1 and -1.

Finally the overall attempt to discern a correlation between the escalation of annual inflation patterns of individual countries and the validation of the PPP through the Johansen Cointegration Test results, does provide some support for such an association but requires further empirical work to definitively establish a link.

The implication of these results is that monetary and fiscal authorities in these countries would be better served by coordinating economic policies to promote stable domestic prices instead of constantly engaging in overt exchange rate management.

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FOOTNOTES

1. This is a very likely attributable to the surge in global petroleum (Trinidad and Tobago's chief export) prices started in the mid-1970's.

2. The symmetry and proportionality conditions are supposed measures of the accuracy of the empirical results from an OLS regression as provided by the coefficient on the domestic and foreign price variables, β_1 and β_2. The symmetry condition states that these be both equal and of opposite sign, while the proportionality condition (the more binding of the two) requires that $\beta_1=1$ and $\beta_2=-1$.

3. The ADF test was done using Eviews which for the level Test requires that the ADF test statistic exceeds (i.e. be less negative) than the test critical values in order to refrain from rejecting the null hypothesis of the existence of a unit root. The first difference test requires that the ADF test statistic be less (i.e. have a greater negative value) than the critical values in order to reject the hypothesis that the series is I (1), i.e. implying that it has more than 1 root (i.e) that the series is stationary.

4. The values reported in Tables 6 and 7 reflect the first column of the Trace and MEV Cointegration tests using LSDR, LPD and LPWI in table 6. Similar values came from the US Dollar instead of the SDR (when issues of near singularity did prevent the software from getting results in the case of some countries because of their close currency ties to the US

Dollar). These results are not reported for the sake of brevity but are available from the author.

5. All of the Caribbean countries (except for the Dominican Republic) reported here have been members of CARICOM for more than 20 years. Likewise, the Central American countries were longstanding members of CACM, which was recently reorganized into CAFTA, now including the Dominican Republic. CAFTA has made considerable progress toward reaching and implementing a Free Trade Area agreement with the US A. Monetary Union is not an imminent prospect for either group.

TABLE 1
BI-DIRECTIONAL TRADE FLOWS

Country & Year	DOT Total	Exports - % with US	Japan	France	Germany	UK	DOT Total	Imports - % with US	Japan	France	Germany	UK
Barbados												
1970	45.5	19.99	0.00	0.00	0.15	39.06	138.8	20.68	3.15	1.36	2.43	30.06
1985	346.1	52.83	0.07	0.01	0.59	5.85	607.3	41.43	4.52	0.96	2.17	9.09
2004	208.9	20.61	0.02	1.21	0.48	14.47	1,476.2	35.21	4.34	1.63	1.42	5.64
Belize												
1970	18.8	0.51	0.19	0.21	1.71	24.35	33.4	33.87	3.39	0.82	2.27	25.40
1985	90.1	46.45	0.10	0.40	0.02	20.16	128.1	49.68	4.38	0.49	0.59	7.91
2000	184.0	52.17	2.17	0.00	0.00	26.09	443.0	50.34	2.48	0.45	2.26	2.71
Costa Rica												
1970	227.0	42.00	4.98	0.88	8.00	0.30	316.7	34.83	9.01	1.30	8.35	4.90
1985	923.7	39.49	0.56	1.26	12.76	2.93	1,096.7	34.67	9.59	1.46	5.32	1.86
2000	7,718.0	43.78	2.24	0.49	3.11	9.68	6,485.0	41.17	3.93	1.39	1.74	0.86
2004	6,301.5	46.92	0.65	0.55	3.74	2.03	8,268.0	46.11	5.85	1.10	2.14	1.02
El Salvador												
1970	236.2	20.72	10.61	0.11	23.94	0.13	213.6	29.64	10.38	0.90	7.89	2.95
1985	679.0	48.22	5.07	0.22	20.97	0.24	961.4	33.89	5.16	0.51	4.37	1.19
2000	1,332.0	23.65	0.75	0.90	7.06	1.13	3,765.0	35.14	3.27	1.01	2.02	0.35
2004	3,294.2	65.61	0.23	0.30	1.04	0.21	6,268.8	46.33	2.14	1.07	1.48	0.33
Guatemala												
1970	290.2	28.28	6.85	0.40	11.33	0.63	284.2	35.32	10.31	1.54	9.61	3.67
1985	1,111.1	33.39	3.00	0.54	6.80	0.38	1,183.9	37.37	5.73	1.93	7.31	1.87
2000	4,325.0	57.66	1.83	0.60	2.59	0.67	5,980.0	34.58	3.29	0.60	2.06	0.79
2004	5,032.0	53.04	0.55	0.17	1.21	0.27	9,470.4	33.99	4.41	0.89	2.01	0.61
Honduras												
1970	171.9	54.08	1.42	0.56	10.93	0.42	220.7	41.46	8.12	0.55	5.49	2.70
1985	780.1	55.10	6.01	0.51	5.32	1.38	888.1	36.09	4.48	2.76	3.41	1.85
2000	4,157.0	69.40	2.60	0.60	2.17	0.94	5,134.0	55.67	2.16	0.74	0.64	0.35
2004	1,704.7	54.39	0.86	0.81	5.87	1.31	3,984.8	37.49	2.33	0.64	3.96	0.32
Jamaica												
1970	339.7	52.84	0.38	0.06	0.56	15.48	524.3	43.12	2.59	1.56	3.09	19.09
1985	568.6	33.75	1.30	0.02	0.69	16.74	1,143.6	42.30	7.07	0.83	1.06	5.22
2000	1,300.0	39.23	2.31	3.15	1.08	11.46	3,192.0	45.46	6.02	0.69	1.32	3.07
2004	1,789.3	17.42	1.84	12.99	5.93	8.73	4,068.4	38.70	4.67	5.56	0.97	2.65
Nicaragua												
1970	180.1	33.11	13.70	0.17	11.56	0.94	198.9	36.35	6.40	0.30	5.77	3.45
1985	287.6	15.60	10.09	5.39	15.31	0.61	697.3	12.35	3.13	5.02	3.65	1.13
2000	1,003.0	54.14	0.60	1.50	4.99	1.00	1,855.0	22.37	4.74	0.49	2.05	0.59
2004	1,445.0	64.81	0.52	0.50	1.46	0.42	2,878.0	22.62	2.25	0.24	1.36	0.26
Panama												
1970	106.5	63.61	0.32	0.08	15.42	0.43	357.0	40.13	6.61	0.84	3.11	2.54
1985	300.6	64.07	0.07	0.17	5.82	1.90	1,391.4	31.48	8.88	1.04	2.26	0.98
2000	783.0	45.21	1.53	0.13	1.66	0.26	3,405.0	32.89	5.49	0.50	1.56	0.94
2004	881.5	50.48	0.28	0.35	0.56	0.75	3,147.3	33.29	6.03	0.57	1.42	0.51
St. Kitts and Nevis												
1995	40.0	52.50	0.00	0.00	0.00	32.50	176.0	36.36	3.41	2.27	0.00	10.80
2000	33.0	66.67	0.00	0.00	0.00	21.21	196.0	57.14	3.57	0.51	0.51	6.12
Trinidad and Tobago												
1970	481.5	50.80	0.60	0.31	0.27	9.62	543.7	16.35	2.48	0.79	1.32	13.26
1980	3,902.7	59.68	0.12	0.37	0.15	1.63	3,158.9	26.49	6.67	0.72	1.36	9.97
2000	3,041.0	46.83	0.07	3.78	0.16	1.74	2,353.0	34.34	3.48	1.19	1.78	3.82
2004	8,492.0	67.08	0.19	3.46	0.38	1.40	5,554.0	23.91	3.45	0.86	11.24	3.51

Note. Author's Calculations from the IMF's Direction of Trade Statcistics.
DOT Total is US$ millions

TABLE 2
AVERAGE ANNUAL INFLATION RATES

Country	1960 to 2003	Last 10 years Available
Belize	2.84	1.72
Panama	2.65	1.01
St. Kitts and Nevis	3.82	3.34
Barbados	7.03	1.92
Trinidad and Tobago	7.79	4.27
Guatemala	8.80	7.75
Honduras	8.92	15.45
El Salvador	8.97	4.44
Costa Rica	13.56	13.04
Jamaica	15.32	13.06
Nicaragua	89.93	9.11

TABLE 3
ORDINARY LEAST SQUARES RESULTS

Country	LPD	LPW	R^2	DW
Belize	-40.00	0.77	0.40	0.17
	(-1.01)	(2.29)		
Panama	-0.76	0.62	0.75	0.15
	(-6.25)	(8.46)		
St Kitts	-0.80	(1.04)	0.43	0.15
	(-3.51)	(4.96)		
Barbados	0.22	-0.01	0.65	0.15
	(1.52)	(-0.05)		
Trinidad	1.02	-0.86	0.93	0.10
	(16.44)	(-8.55)		
Guatemala	1.05	-0.66	0.96	0.17
	(37.74)	(-12.89)		
Honduras	1.10	-0.90	0.95	0.33
	(36.91)	(13.95)		
El Salvador	0.75	-0.60	0.84	0.83
	(15.83)	(-6.17)		
Costa Rica	0.96	-0.26	0.99	0.34
	(72.61)	(-7.31)		
Jamaica	1.02	-0.59	0.99	0.14
	(48.27)	(-9.54)		
Nicaragua	1.07	-3.94	0.99	0.43
	(81.45)	(-8.30)		

Note. The numbers in brackets are the T-Statistics

TABLE 4
UNIT ROOT TEST RESULTS FOR CCA COUNTRIES

Country	LBXUS	DLBXUS	LBXUK	DLBXUK	LBXF	DLBXF	LBXJ	DLBXJ	LPD	DLPD
Belize	-2.93	-7.86	-1.98	-8.55	-2.60	-8.62	-2.69	-7.43	-1.13	-9.75
Panama	-1.15	-12.79	-1.37	-12.02	-1.30	-11.88	-0.77	-11.00	-1.35	-4.98
St. Kitts	-1.24	-8.61	-1.52	-7.86	-2.36	-7.59	-0.90	-7.78	-3.11	-3.02
Barbados	-1.15	-12.79	-1.37	-12.02	-1.30	-11.88	-0.77	-11.00	-1.35	-4.98
Trinidad	-0.69	-14.08	-0.64	-13.04	-0.39	-11.69	-0.08	-11.21	-0.25	-4.72
Guatemala	0.06	-13.42	0.04	-12.08	0.19	-11.89	0.26	-11.74	1.49	-5.49
Honduras	0.031	-17.59	0.049	-17.92	0.43	-16.88	0.54	-16.67	2.65	-4.95
El Salvador	-0.61	-14.35	-0.44	-13.36	-0.51	-12.16	-0.17	-12.05	0.52	-4.09
Costa Rica	0.74	-11.26	0.55	-11.31	1.23	-13.00	0.82	-12.32	0.90	-6.11
Jamaica	0.40	-9.81	0.29	-10.02	0.49	-9.26	0.34	-9.05	0.88	-5.32
Nicaragua	-0.77	-6.62	-0.77	-6.56	-0.74	-6.53	-0.80	-6.53	-1.02	-3.76

TABLE 5
UNIT ROOT TEST RESULTS FOR DEVELOPED COUNTRIES

	Level	1st Difference
Countries	LP	DLP
US	-0.93	-4.21
UK	-1.64	-4.30
France	-1.93	-2.76
Japan	-4.14	-4.18
Composite Countries	-2.33	-3.17
SDR (Against the US Dollar)	-0.49	-13.09

TABLE 6
TRACE COINTEGRATION TEST

Country	CE	LSDR		LBXUS		LBXUK		LBXF		LBXJ	
Belize	0	30.62		40.10		26.56		34.49		31.48	
	1	14.00		17.85		12.27		17.80		8.91	
	2	5.57	1	3.20	2	3.62	0	6.70	3	1.45	1
Panama	0	22.11		19.49		23.75		36.47		39.70	
	1	11.88		6.27		8.44		16.92		22.45	
	2	2.07	0	0.76	0	3.30	0	3.86	3	9.60	3
St. Kitts	0	34.77		34.80		36.17		46.58		25.09	
	1	13.41		11.11		10.54		16.25		8.94	
	2	6.28	1	2.44	1	2.27	1	5.70	3	0.26	0
Barbados	0	40.74		26.00		45.13		31.29		31.81	
	1	17.87		12.86		19.74		14.84		15.54	
	2	7.60	3	5.35	0	8.49	3	6.13	1	5.21	3
Trinidad	0	47.01		45.36		45.00		40.37		48.65	
	1	17.42		18.06		17.00		17.14		18.10	
	2	3.69	2	2.23	2	3.41	2	3.75	2	6.61	3

Guatemala	0	34.45		23.33		21.77		40.24		36.84	
	1	13.32		7.75		10.92		17.32		13.54	
	2	5.60	1	0.82	0	3.07	0	4.00	3	5.20	3
Honduras	0	22.07		21.54		17.38		27.90		22.46	
	1	7.08		7.78		5.93		9.56		7.85	
	2	1.16	2	0.23	0	1.06	0	1.38	0	1.14	0
El Salvador	0	44.93		30.54		37.38		50.92		39.84	
	1	18.54		13.33		11.88		20.05		19.00	
	2	5.95	3	2.56	1	6.36	1	6.78	3	6.38	3
Costa Rica	0	42.53		39.68		40.83		58.26		39.25	
	1	17.50		14.29		15.25		18.43		19.73	
	2	2.59	2	1.97	1	1.23	1	2.41	2	4.11	3
Jamaica	0	39.35		29.43		34.89		39.73		32.00	
	1	13.91		10.64		12.24		14.15		12.54	
	2	2.72	1	0.88	1	1.96	1	1.78	1	4.21	1
Nicaragua	0	44.25		47.17		39.67		56.09		37.42	
	1	13.04		18.41		12.38		25.42		9.31	
	2	5.53	1	7.02	3	5.64	1	9.83	3	3.02	1

TABLE 7
MAXIMUM-EIGEN VALUE COINTEGRATION TEST

Country	CE	LSDR		LBXUS		LBXUK		LBXF		LBXJ	
Belize	0	16.66		22.23		14.29		16.69		22.57	
	1	8.39		14.66		8.65		11.09		7.46	
	2	5.57	0	3.19	2	3.62	0	6.71	0	1.45	1
Panama	0	18.14		13.22		15.31		19.54		17.25	
	1	8.51		5.52		5.14		13.06		12.84	
	2	4.90	0	0.76	0	3.30	0	3.86	0	9.60	0
St. Kitts	0	21.36		23.69		27.93		30.32		16.15	
	1	7.13		8.67		9.09		10.55		8.68	
	2	6.28	1	2.44	1	4.05	1	5.70	1	0.26	0
Barbados	0	22.88		13.14		25.40		16.42		16.27	
	1	10.20		7.51		11.25		8.71		10.33	
	2	7.66	1	5.35	0	8.49	1	6.13	0	5.21	0
Trinidad	0	29.59		27.26		20.81		23.22		30.55	
	1	13.73		15.84		13.58		13.39		11.50	
	2	3.69	1	2.23	2	3.41	1	3.75	1	6.61	1

Guatemala	0	21.13		15.58		18.21		22.91		23.30	
	1	7.72		6.93		5.47		13.37		8.34	
	2	5.60	0	0.82	0	5.05	0	3.95	1	5.20	1
Honduras	0	14.99		13.76		11.45		18.35		14.61	
	1	5.93		7.55		4.87		8.18		6.71	
	2	1.16	0	0.23	0	1.06	0	1.38	0	1.14	0
El Salvador	0	26.38		17.20		23.50		30.88		20.85	
	1	12.60		10.77		7.51		13.27		12.62	
	2	5.95	1	2.58	0	6.36	1	6.78	1	6.38	0
Costa Rica	0	25.03		15.46		25.57		39.83		19.52	
	1	14.91		13.96		14.02		16.03		15.62	
	2	2.59	2	3.42	0	1.23	1	2.41	2	4.11	0
Jamaica	0	25.45		18.79		22.65		25.58		19.45	
	1	11.19		9.76		10.28		12.37		8.33	
	2	2.72	1	0.88	0	1.96	1	1.78	1	4.21	0
Nicaragua	0	31.20		28.76		27.29		30.67		35.00	
	1	7.52		11.39		6.74		15.59		7.10	
	2	5.53	1	7.06	1	5.64	1	9.83	3	0.43	1

TABLE 8
PARAMETERS OF THE COINTEGRATING VECTORS

Country	LSDR	LPD	LPW1
Belize	1.00	-1.0488	-0.7640
Panama	1.00	-0.4441	0.4963
St. Kitts	1.00	-0.3693	-1.2274
Barbados	1.00	4.5541	-6.5974
Trinidad and Tobago	1.00	0.3130	-1.8549
Guatemala	1.00	-1.1316	1.0239
Honduras	1.00	-1.0623	1.0549
El Salvador	1.00	-1.1623	1.4539
Costa Rica	1.00	-0.9619	0.3719
Jamaica	1.00	-0.9256	0.5847
Nicaragua	1.00	-1.0526	1.7806