FINANCIAL INTEGRATION OF BELIZE WITH CENTRAL AMERICA AND WITH CARICOM

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Outline for Presentation

1. Motivation

2. Financial Integration Indicators Employed In This Study

3. Methodology Used and Results

4. Conclusion

MOTIVATION

▸ Numerous studies have been conducted on financial integration spanning decades covering how financial markets have deepened in different geographical regions across the globe.

▸ However, most of these studies looked at how financial integration has deepened in Asia, Europe or Africa and even the Caribbean but far few have focused on the Central America region including Belize & Mexico.

▸ This paper will attempt to fill in the gap by using three different indicators of financial integration to measure the degree of financial integration of Belize with Central America and with CARICOM.

THREE MEASURES OF FINANCIAL INTEGRATION USED IN THE STUDY ARE :

1. Interest Rate Spread

2. Sigma Convergence

3. Beta convergence

Normally these three measures are employed to measure financial integration in the credit market.

Since Belize doesn't have a stock market, an active government bond market, municipal bond market, etc. in comparison with the other Central American nations, Mexico and CARICOM, the credit market was the common (market) among all these countries.
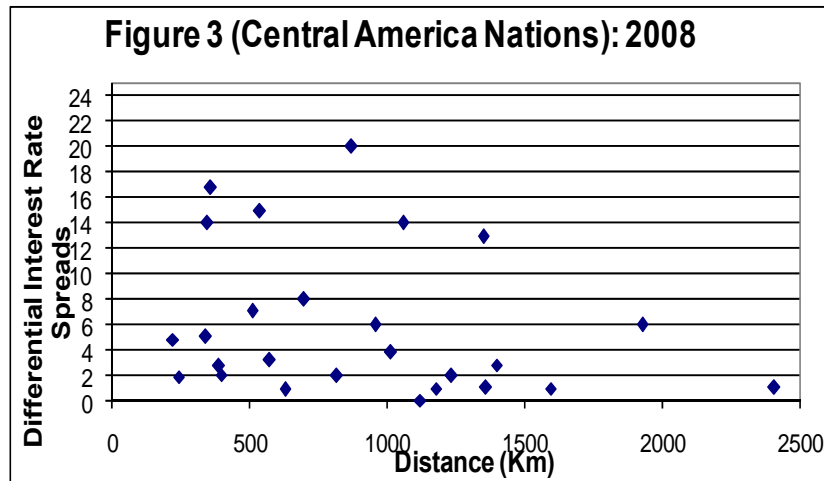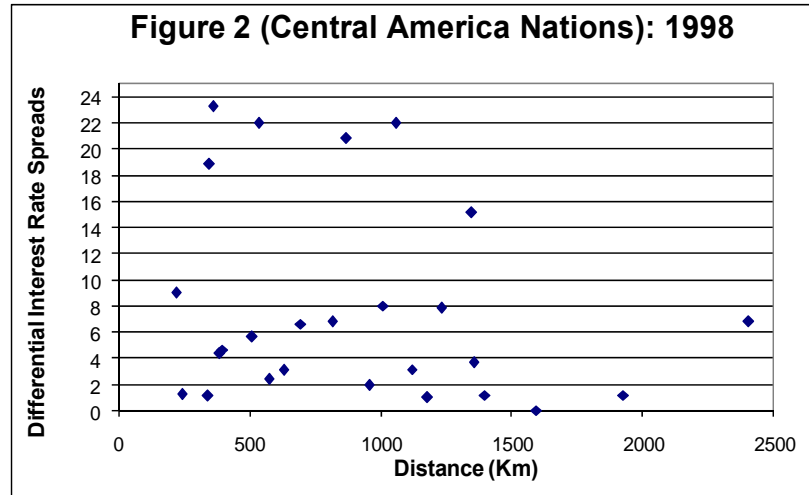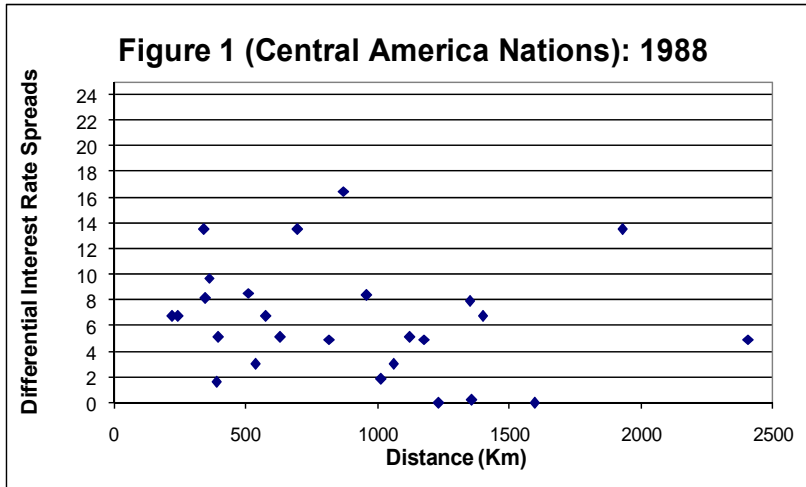
METHODOLOGY AND RESULTS

▸ **Interest Rate Spread**

▸ Interest rate spread was one of the easiest and quickest measures of financial integration to compute. We simply subtracted the deposit interest rate from the lending interest rate, that is:
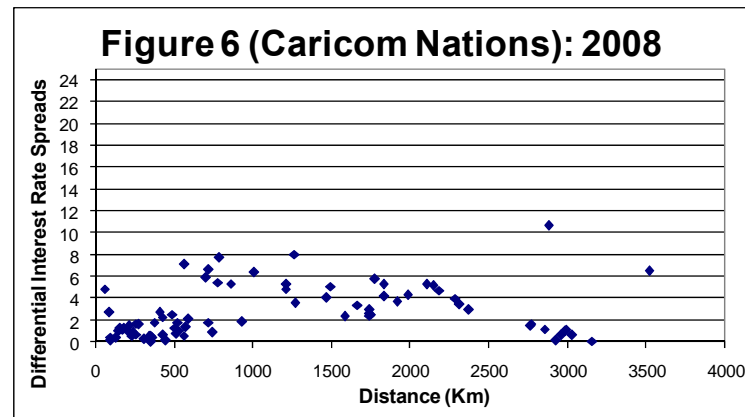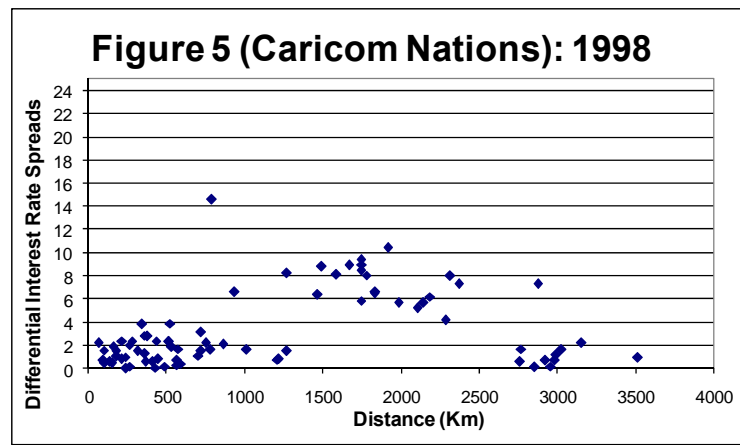
▸ $I = I_l - I_d$
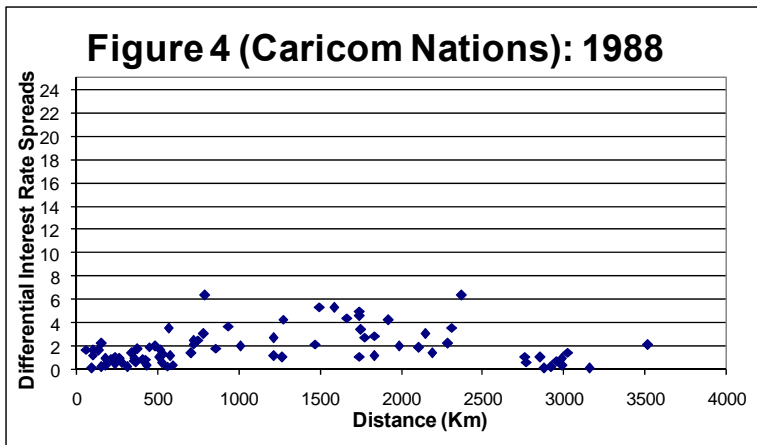
We then compared the differentials in interest rate spread for each country by graphing it against the difference in distance from each individual country (in Central America and Caricom) at a specific point in time. Figures 1-6 illustrate this, also note that as the plots are coming closer and closer together (for every 10 year progression) suggest that financial integration is deepening.

INTEREST RATE SPREADS Cont'd

Figure 1 (Central America Nations): 1988

Figure 2 (Central America Nations): 1998

Figure 3 (Central America Nations): 2008

INTEREST RATE SPREADS Cont'd

Figure 4 (Caricom Nations): 1988

Figure 5 (Caricom Nations): 1998

Figure 6 (Caricom Nations): 2008

SIGMA CONVERGENCE

- Sigma convergence is generally calculated as the standard deviation of the interest rate spread across the various countries at a specific point in time. Mathematically this is represented as:

$$\sigma_i = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(I_{i,t} - \bar{I}_i)^2}$$

- where σ is the standard deviation of the interest rate spread of country i,

SIGMA CONVERGENCE CONT'D

▶ $I_{i,t}$ is the interest rate spread of a particular country i at period t

▶ n is the number of countries that we used in the sample.

▶ In this paper sigma convergence was determined for the Central American countries including Mexico and CARICOM and then varied or made into sub groups according to certain characteristic features of the respective countries such as whether they operate under a fixed or floating exchange rate regime and also on the close proximity of other Central American Countries & Mexico to Belize (for e.g. Belize and Mexico as one group and Belize, Mexico, Guatemala and Honduras as another group). Figures 7-14 depict this and also note that in general as the points converge to one point, the degree of financial integration strengths across the countries over time.

SIGMA CONVERGENCE CONT'D

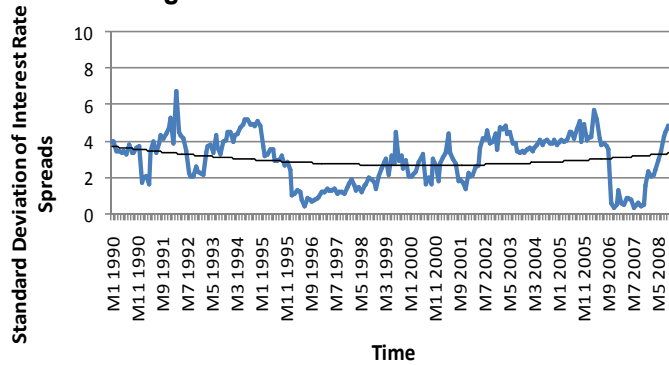**Figure 7: Sigma Convergence of Fixed Exchange Countries within Central America**

Figure 8: Sigma Convergence between Floating Exchange Countries within Central America & Mexico
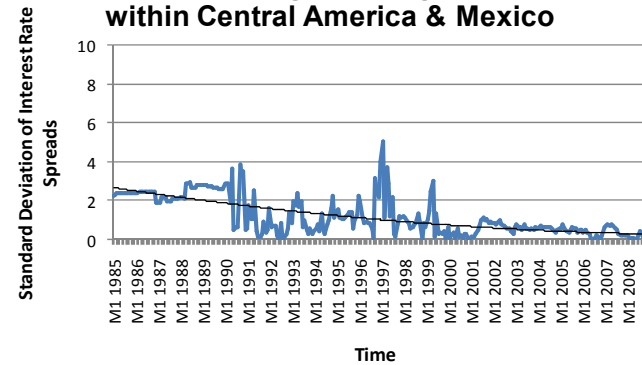
Figure 9: Sigma Convergence among Central America Countries
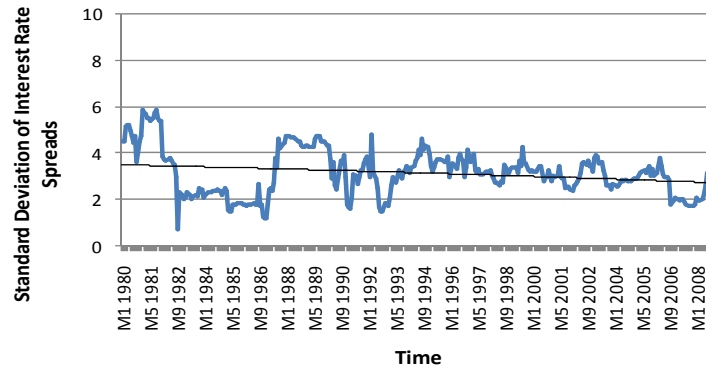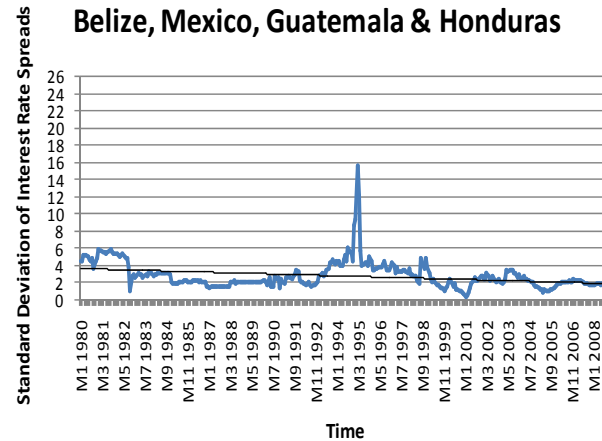
SIGMA CONVERGENCE CONT'D

Figure 10: Sigma Convergence between Belize & Mexico

Figure 11: Sigma Convergence between Belize, Mexico, Guatemala & Honduras

SIGMA CONVERGENCE CONT'D

Figure 12: Sigma Convergence of Fixed Exchange Caricom Countries
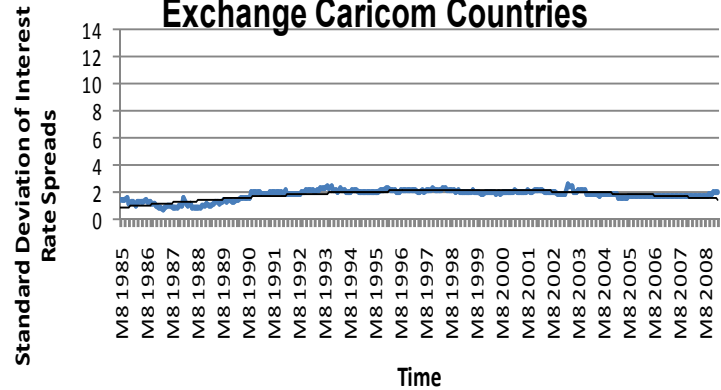
Figure 13: Sigma Convergence of Floating Exchange Caricom Countries
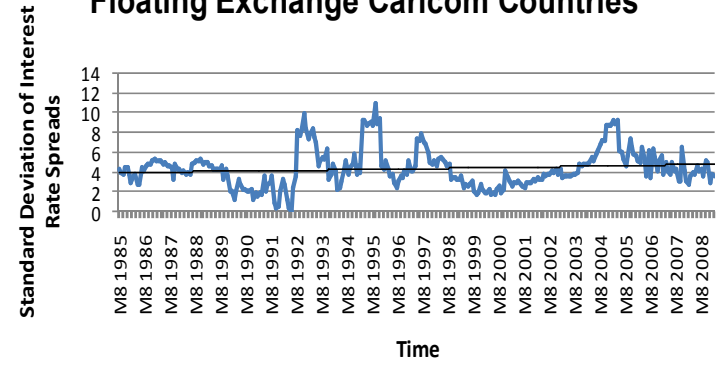
Figure 14: Sigma Convergence of Caricom Countries
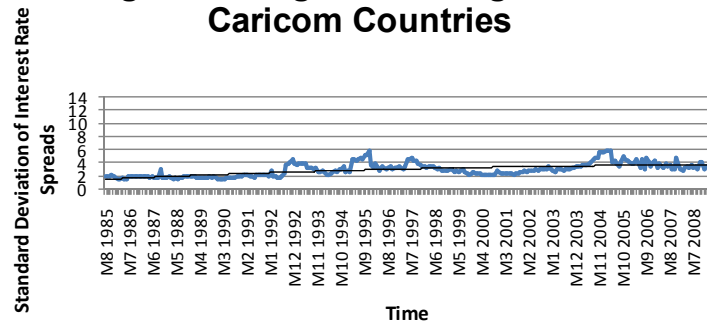
BETA CONVERGENCE

▸ Beta convergence is another indicator of financial integration that measures how fast the adjustment of deviations of countries to the long run benchmark value.

▸ This was accomplished by using time series regression of the deviation of the interest rate spread from a US benchmark on the lag of the interest rate spread of a domestic country and the lag of the deviation of the interest rate spread from the US benchmark.

BETA CONVERGENCE CONT'D

$$\Delta I_{i,t} = c_i + \beta I_{i,t-1} + \sum_{i=1}^{L} \gamma_l \Delta I_{i,t-1} + \varepsilon_{i,t}$$

The aforementioned regression is represented by the equation above where:
- $\Delta \textbf{\textit{I}}$ is the deviation of the interest rate spread from the US benchmark,
- ε is the error term,
- $\textbf{\textit{i}}$ is the country index,
- t is the time index and
- β represents the speed of convergence.

BETA CONVERGENCE CONT'D

❑ The higher the absolute value of β the higher the speed of convergence.

❑ Also note that financial convergence is evident when the beta coefficient is negative.

Some Preliminary Diagnostic Tests

o Note that before the regression was run against the independent variables, the Augmented Dickey Fuller Test was administered to all the variables to test for stationarity.

o Now for those variables that were stationary, the beta convergence ordinary least square time series regression that was stated above was conducted to each specific country that contained these $I(0)$ series. These results is clearly illustrated in Table 1 and Table 2.

o For those variables that were not stationary at levels, the first difference was taken to establish stationarity. These non-stationary variables at levels were found to be stationary or integrated of order one after the first differences were taken.

o Now for all these $I(1)$ variables, the Johansen cointegration test was done to see if the variables were cointegrated and possibly have a long term relationship.

RESULTS

1. OLS analysis was conducted the following countries: El Salvador, Mexico & Nicaragua since the variables of interest that are associated with the beta convergence for each of these respective countries were all I(0).

Table 1 (OLS Time Series Results for Beta Convergence):

Country	Time Period	Beta Coefficient	P-value	R-squared
Mexico	M10 1993 - M12 2008	0.8718	0.0000	0.7614
Nicaragua	M2 1990 - M12 2008	0.7715	0.0000	0.5703
Honduras	M2 1985 - M12 2008	0.8073	0.0000	0.8242
El Salvador	M2 1996 - M12 2008	0.7352	0.0000	0.3946

METHODS & RESULTS CONT'D

- Johansen Cointegration test was conducted between the beta independent variable and the dependent variable since these variables were found to be I(1).

- Johansen Cointegration test was done for the following countries: Belize, Costa Rica, Guatemala and Panama individually.

- The results of this test revealed that Costa Rica and Panama were not cointegrated so this would suggest that there is no financial integration between each of these individual countries with the other Central American nations and Mexico.

Table 2: Cointegration Equations

Normalized Cointegrating Coefficients: Belize

I	BZL	C
1.000000	-0.726004	0.741320
	(-11.8460)	

Normalized Cointegrating Coefficients: Guatemala

I	GUAT	C
1.000000	-0.914235	1.783043
	(-59.5202)	

Estimated Long-run equilibrium beta convergence equations for Belize

I = 0.726004BZL - 0.741320

Estimated Long-run equilibrium beta convergence equations for Guatemala

I = 0.914235GUAT - 1.783043

- On the other hand, Belize and Guatemala were found to be cointegrated and thus have a long run relationship.

- However, in Table 2, note that the positive sign on the beta coefficient in the estimated long run equilibrium beta convergence equation suggest that these nations are not converging with the other Central American Nations and Mexico.

OLS analysis was also administered to the following countries in CARICOM: Barbados, Grenada, Guyana, Haiti, Jamaica, St. Kitts & Nevis, St. Lucia & St. Vincent & Grenadines since the variables of interest that are associated with the beta convergence for each of these respective countries are all I(0).

Table 3: (Time Series OLS Beta Convergence Results)

Country	Time Period	Beta Coefficient	P-Value	R-squared
Barbados	M2 1981 - M10 2008	0.8054	0.0000	0.4311
Grenada	M1 1983 - M3 2009	0.0230	0.7036	0.0005
Guyana	M1 1981 - M3 2009	0.8831	0.0000	0.9076
Haiti	M10 1994 - M3 2009	0.9129	0.0000	0.8011
Jamaica	M1 1980 - M3 2009	0.8960	0.0000	0.8824
St. Kitts & Nevis	M1 1981 - M3 2009	0.7720	0.0000	0.7498
St. Lucia	M1 1982 - M3 2009	0.7164	0.0000	0.7936
St. Vincent & Grenadines	M1 1983 - M3 2009	0.6254	0.0000	0.4058

CONCLUSION

- Interest rate spread measures suggest convergence at a slow pace in Central America & CARICOM for 1998 and 2008.

- Sigma convergence measures suggest convergence at a slow pace in Central America from 1980 to 2008.

- Sigma convergence measures suggest convergence at a slow pace in CARICOM from 2000-2008.

- Beta convergence measures suggest that there is no financial integration of Belize with Central America and CARICOM.

THANK YOU !!!!!!