**Appendix XX: Quantifying Caribbean Island Country Foreign Investment Risk**

*4/27/17*

**Introduction**

In general, both political and economic conditions of a country determine how much risk is associated with investing in that country, and thus how much foreign direct investment is likely to occur (Schneider and Frey 1985). Political and economic instability has been identified as a major limiting factor to aquaculture development in the Caribbean (Rojas and Wadsworth 2007). This makes aquaculture unattractive to investors due to concerns that policies affecting aquaculture business will shift before they are able to make a profit. Here, we modify previously published methodologies for quantifying country investment risk to quantify a country’s relative investment risk in the Caribbean, where limited data on economic and political conditions are available.

**Foreign Investment Risk Matrix**

Bhalla (1983) developed the Foreign Investment Risk Matrix (FIRM) to assist investors in classifying the political and economic risks associated with investing in different countries using discrete risk categories. An expanded version of FIRM was developed by McGowan and Moeller (2009) that utilizes 3 political and 3 economic continuous risk variables that are readily available for most countries on the internet to quantify. The risk matrix developed by McGowan and Moeller (2009) is presented in Table 1 along with the data source used for each economic and political risk variable. For each variable, a country’s rating is given by the data source that is then transformed to a scale of 1 (low risk) to 5 (high risk) and multiplied by the specified weight to determine the variable’s final score (R x W) (Table 1). Political and economic risk scores are then calculated by taking the sum of final scores for all three variables. The total risk score is then calculated by multiplying the political and economic risk scores by the specified weight and then summing the values. The weights shown in *Table 1* were arbitrarily chosen by McGowan and Moeller (2009). In practice, they recommend weighting variables according to relevance and importance to the particular project that is being assessed.

**Identifying Risk Variables for the Caribbean**

Limited data for the risk variables identified by McGowan and Moeller (2009) were available for the Caribbean. Only 3 countries in our study had data available Conflict variable and only 9 Caribbean countries in our study had data available for all five of the other McGowan and Moeller’s risk variables. To calculate appropriate risk scores for the island countries in our region, we identified comparable, substitute risk variables for each of McGowan and Moeller’s risk variables that had more data widely available for the region. We then calculated Pearson’s correlation coefficients and significance vales between McGowan and Moeller’s risk variables and our selected substitute variables using countries that had data available for both sets (Table 2) .

*Table 2* shows the Pearson’s correlation coefficients (*r*) and associated p-values between the original McGowan and Moeller 2009 risk variables and the substitute variables we used to assess investment risk in the Caribbean. Although there were not enough data for the conflict variable in the Caribbean to calculate a correlation coefficient, we assumed WRI’s political stability score was a logical substitute. GDP per capital data were widely available, thus a substitute component for this variable was not necessary.

**Calculating Relative Caribbean Country Investment Risk**

Ratings for all political and economic risk components used to calculate final risk value are presented In *Table 3*. All data presented in *Table 3* were transformed to a relative scale of 1 (low risk) to 5 (high risk). All political and economic variables were given an equal weight by taking the average of the 3 economic and political variables, respectively. The final risk score was calculated by taking the average of the political and economic score for each country (*Table 4*).

Averages of political and economic variables were calculated by removing any variables where data were not available for that country. In some cases this meant that the only data used to calculate the final relative risk score was GDP per capita. We assumed when other data were not available using only GDP per capita to determine risk was a reasonable approach because Bhalla (1983) states that this variable is one of the most important in determining both political and economic risk because income per capita reflects both the underlying economy and the effectiveness of political management. For the 14 countries that had data available for all variables, we found GDP to be a significant (*r* = 0.88, *p-value* = < 0.001) predictor of the final risk score, providing further support for this approach (*Figure 1*).

*Table 1.* Foreign investment risk matrix developed by McGowan and Moeller (2009). Political and economic risk variables are used to calculate the risk associated with foreign direct investment of a country.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Variable | Data Source | | Rating | | Weight | R x W |
| Political Risk | Attitude of government | Index of Economic Freedom sub-index for capital flows and foreign investment (Beach and Driscoll 2002) | |  | 0.35 | |  |
| Conflict | Conflict Barometer (Heidelberg Institute of International Conflict) | |  | 0.35 | |  |
| Corruption | Corruption Perceptions Index (Transparency International) | |  | 0.30 | |  |
|  | *Total Political Risk Score*: | | | | |  |
| Economic Risk | GDP per capita | World Development Indicators (World Bank) | |  |  | |  |
| FDI Potential | Inward FDI Potential Index (UNCTAT) | |  |  | |  |
| Inflation rates | Index of Economic Freed sub-index for monetary policy | |  |  | |  |
|  | *Total Economic Risk Score:* | | | | |  |
|  |  |  | **Weight** | | **Value** | | **W x V** |
| Total Risk Factor | Political Risk |  | | 0.60 |  | |  |
| Economic Risk |  | | 0.40 |  | |  |
|  | *Total Risk:* | | | | |  |

*Table 2.* Pearson correlation coefficients (r) and associated p values between riskvariables used in McGowan and Moeller 2009 and substitute risk variables used in our risk analysis of Caribbean countries.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| McGowan and Moeller’s Variable | Caribbean Substitute Variable | Substitute Risk Variable Data Source | Sample Size | *r* | *p*-value |
| Attitude of government | Regulatory quality | World Governance Indicator (World Bank) | 10 | 0.83 | < 0.05 |
| Conflict | Political stability | World Governance Indicator (World Bank) | 3 | NA | NA |
| Corruption | Control of corruption | World Governance Indicator (World Bank) | 11 | 0.79 | < 0.05 |
| FDI potential | FDI net inflows | United Nations Conference on Trade and Development Statistics | 9 | 0.76 | < 0.05 |
| Inflation rates | CPI Growth | United Nations Conference on Trade and Development Statistics | 10 | 0.74 | < 0.05 |

*Table 3.* Data for political (orange) and economic (blue) components used to calculate Caribbean country Foreign Direct Investment (FDI) risk.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Island Country | Regulatory Quality | Political Stability | Control of Corruption | GDP per capita (current US $) | FDI inflows (millions of US$) | | CPI Growth (%) |
| Anguilla | 0.89 | 1.32 | 1.25 | 21,382 | 85.45 | -1.86 | |
| Antigua and Barbuda | 0.53 | 1.07 | 0.67 | 14,253 | 154.06 | 0.72 | |
| Aruba | 1.38 | 1.26 | 1.31 | 26,406 | -22.57 | 0.48 | |
| Bahamas | 0.25 | 0.96 | 1.29 | 21,962 | 384.91 | 1.86 | |
| Barbados | 0.51 | 1.32 | 1.79 | 15,253 | 254.52 | -1.20 | |
| Bonaire |  |  |  | 21,000 |  |  | |
| British Virgin Islands |  |  |  | 30,880 | 51605 | 0.84 | |
| Cayman Islands | 0.82 | 1.19 | 1.03 | 57,458 | 18987.38 | -2.93 | |
| Cuba | -1.25 | 0.58 | 0.07 | 7,929 |  | 4.61 | |
| Curaçao |  |  |  | 19,869 | 175.14 | 0.00 | |
| Dominica | 0.26 | 1.19 | 0.62 | 7,089 | 35.96 | -1.48 | |
| Dominican Republic | -0.04 | 0.17 | -0.77 | 6,388 | 2221.5 | 0.84 | |
| Grenada | 0.01 | 0.81 | 0.31 | 8,610 | 60.67 | -1.00 | |
| Guadeloupe |  |  |  | 21,780 |  |  | |
| Haiti | -1.16 | -0.73 | -1.26 | 790 | 104.2 | 9.02 | |
| Jamaica | 0.11 | 0.09 | -0.33 | 4,945 | 794.48 | 3.68 | |
| Martinque | 1.25 | 1.01 | 1.25 | 24,118 |  |  | |
| Montserrat |  |  |  | 12407 | 4.15 | -1.18 | |
| Puerto Rico | 0.98 | 0.84 | 0.13 | 15,900 | 78.16 |  | |
| Saba |  |  |  | 23,600 |  |  | |
| Saint Kitts and Nevis | 0.17 | 0.67 | 0.27 | 15,645 | 75.67 | -1.72 | |
| Saint Lucia | 0.28 | 0.86 | 0.45 | 7,761 | 95.03 | -0.26 | |
| Saint Vincent and the Grenadines |  |  |  | 6,652 | 120.74 | -1.73 | |
| Saint-Barthelemy |  |  |  | 27,700 |  |  | |
| Saint-Martin |  |  |  | 19,300 |  |  | |
| Sint- Eustatius |  |  |  | 26,400 |  |  | |
| Sint-Maarten |  |  |  | 27,789 | 10.76 |  | |
| Trinidad and Tobago | 0.15 | 0.27 | -0.54 | 21,698 | 1618.61 | 4.66 | |
| Turks and Caicos |  |  |  | 23,592 |  | -0.31 | |
| Virgin Islands | 0.53 | 1.32 | 0.67 | 36,100 |  |  | |

*Table 4.* Final relative risk scores. Risk score values that were calculated using only GDP are shown in bold. Countries with lower risk scores are expected to have lower risk for FDI. The relationship between risk and GDP per capita is shown in *Figure 1*.

|  |  |  |  |
| --- | --- | --- | --- |
| Island Country | Political Score | Economic Score | Final Risk Score |
| Cayman Islands | 0.95 | 0.10 | 0.53 |
| Aruba | 0.10 | 2.29 | 1.20 |
| Martinque | 0.30 | 2.45 | 1.38 |
| Virgin Islands | 1.39 | 1.61 | 1.50 |
| Anguilla | 0.85 | 2.65 | 1.75 |
| Puerto Rico | 0.71 | 3.03 | 1.87 |
| British Virgin Islands | NA | 1.98 | 1.98 |
| Sint-Maarten | NA | 2.19 | **2.19** |
| Saint-Barthelemy | NA | 2.20 | **2.20** |
| Bahamas | 1.82 | 2.61 | 2.21 |
| Barbados | 1.42 | 3.08 | 2.25 |
| Antigua and Barbuda | 1.39 | 3.15 | 2.27 |
| Sint- Eustatius | NA | 2.29 | **2.29** |
| Trinidad and Tobago | 1.97 | 2.62 | 2.30 |
| Saba | NA | 2.49 | **2.49** |
| Turks and Caicos | NA | 2.49 | 2.49 |
| Saint Kitts and Nevis | 1.94 | 3.05 | 2.50 |
| Guadeloupe | NA | 2.62 | 2.62 |
| Bonaire | NA | 2.67 | **2.67** |
| Saint Lucia | 1.77 | 3.61 | 2.69 |
| Dominica | 1.80 | 3.66 | 2.73 |
| Curaí\_ | NA | 2.75 | 2.75 |
| Saint-Martin | NA | 2.79 | 2.79 |
| Grenada | 2.18 | 3.55 | 2.87 |
| Jamaica | 2.03 | 3.81 | 2.92 |
| Dominican Republic | NA | 3.70 | 2.98 |
| Montserrat | NA | 3.28 | 3.28 |
| Saint Vincent and the Grenadines | 4.10 | 3.69 | 3.69 |
| Cuba | 3.96 | 3.60 | 3.85 |
| Haiti |  | 4.10 | 4.03 |



*Figure 1.* Observed (points) and predicted (blue line) relationship between GDP per capita (current US$) and country risk scores. Upper and lower 95% confidence intervals are indicated by grey shading and predictor limits are indicated by dotted lines.