Estimating the Real Effective Exchange Rate (REER) for Belize

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Abstract

The purpose of this paper is to assess Belize's external competitiveness primarily through calculating the real effective exchange rate (REER) index for the period 2000-2009. This paper expands on earlier works on the REER by Brownbridge and Arana by estimating a "composite" index that takes into account "third party competition" as well as the traditional approaches based on direct import and export competition. Two more types of competitiveness indicators are also calculated, namely a commodity based REER and a tourism oriented REER. The results for all three REER indices showed that for the period under review the index was generally falling, meaning that the exchange rate depreciated. A depreciation of the currency is understood to signify a gain in the competitiveness of the country's external sector.

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1.0 Introduction

Competitiveness is an important factor in determining long term growth since a worsening of the competitive position of a country can lead to a fall in export receipts as well as a rise in the import bill and consequent widening in the current account deficit of the balance of payments. In the case of Belize, which is a small open economy with a ratio of exports and imports to GDP averaging 1.2[1] between 2000 and 2010, the ability to earn foreign exchange via a competitive external sector is essential in determining its capacity to cover its import bill and service its external debt obligations, particularly in light of reductions in the preferential access arrangements for two of the country's major agricultural export commodities (sugar and bananas), a decline in external grants, a large external public sector debt (75.0% of GDP in 2009) and the difficulty of accessing concessional loans in the international financial markets.

Since 1976, the value of the Belizean currency has been fixed at a rate of BZ$2 to US$1, which means that any movements of the US dollar relative to other currencies affects the value of the Belize dollar relative to those currencies, so causing the exchange rate to become undervalued or overvalued over time. In either case, analyzing the changes in the competitiveness of the local export sector becomes very relevant.

A country is said to be competitive when it faces high international demand for its products. In theory, if country A can sell its product at a price below that of its competitor, country B, then country A has a competitive edge, and its product will be demanded. Since the volume of local output is negligible with respect to total world production, Belizean producers are "price takers" and their issue of competitiveness depends on their ability to keep costs below those of their competitors while maintaining a margin of profitability that will create the incentive to continue exporting. Although competitiveness extends beyond just keeping costs down and also involves the improvement of product quality, customer relations, marketing, technology, innovation and productivity, these factors are not easily measured, much less available for cross country comparisons. The definition of international competitiveness is therefore confined to the much narrower meaning based on relative price or cost comparison measured by the real effective exchange rate (REER). The term 'effective' means that several exchange rates are combined to form an index where the exchange rate and price index of each competitor country are assigned a weight based on their importance in the given country's trade basket.

Earlier work on Belize's REER includes Brownbridge (1987) who explored a profitability index for the export sector and Arana (1997) who calculated a quarterly trade weighted REER. The Composite REER index that is presented in this paper expands on these earlier efforts by including the notion of "third party competition" through a global index of competitiveness (Cooper, 1988) as well as a bilateral import and export index. Two more types of competitiveness indicators are also estimated namely a commodity based REER and a tourism oriented REER. The commodity based REER was constructed to measure competition between Belize and those countries that are main producers of the commodities which Belize produces. The tourism competitor REER was constructed, as this activity is a major source of employment and generator of foreign exchange.

[1] The higher the value of the ratio means that trade is growing faster than GDP and therefore trade creation is taking place.

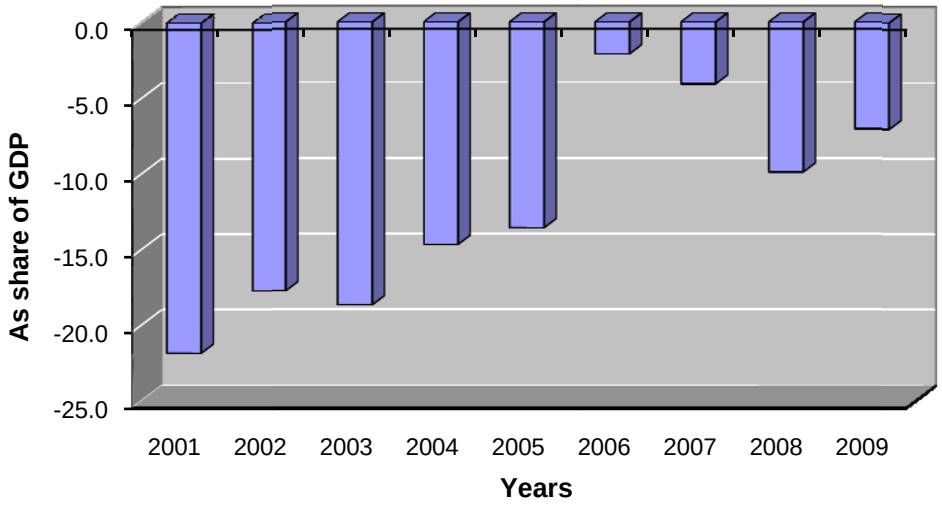
The analysis covers the period 2000 to 2009 and is in an excel spreadsheet format that facilitates annual updates. The paper is structured as follows: Section II presents stylized facts focusing on Belize's trade performance; Section III explores the literature on external competitiveness and the REER, emphasizing the definitional and measurement issues. Section IV expounds on the methodologies used in the construction of the REER while Section V discusses the trend in the movement of the REER and compares the results of the different indicators calculated. Section VI presents the conclusions.

2.0 Stylized Facts

2.1 Analysis of movements in the External Current Account

Over the past decade, Belize's external current account deficits have been largely driven by persistent merchandise trade deficits that reflect the country's dependency on imports[2]. For the greater part of the decade, the major source of export earnings was the major traditional export crops of sugar and bananas with earnings from the sale of citrus juices and marine products, specifically shrimp, also being very significant. Petroleum exports started in 2006 and since 2007 accounted for the greater share of total export earnings.

Chart 1: Current Account Balance



For the first five years of the sample period (2001 to 2005) the current account deficit averaged 17.3% of GDP compared to an average of 5.8% from 2006 to 2009. The latter period coincided with a more austere fiscal stance due to the prior buildup in the external public sector debt to unsustainable levels and also reflected a significant improvement in the services balance stemming from a significant rise in tourism inflows. The current transfers balance also improved due to significant grant inflows from Taiwan and Venezuela. In contrast, there was only marginal improvement in the trade deficit as contractions in export earnings from sugar, citrus concentrate, marine products, and garments overshadowed the emergence of petroleum as a major export earner. The contribution of petroleum revenue to total export earnings grew from 16.5% in 2006 to approximately 24.0% in 2009.

From 2001 to 2007, stay-over arrivals grew at an annual average rate of approximately 5.1% while tourist expenditure rose by 14.9% annually. However, in 2008 and 2009 stay-over visitors contracted by 3.9% and 11.9%, respectively, and pushed receipts downwards . Most of this reduction occurred in tourists from the United States, the country's largest market, which was experiencing the recessionary spinoffs of increasing unemployment and dwindling consumer spending.

[2] From 2000 to 2009 the ratio of imports of goods and services to GDP averaged 0.65.

During the first half of the decade, cruise tourism disembarkations grew exponentially as tourism authorities lobbied with the cruise lines to increase the number of port calls to the country. One of the main inducements was the opening of the Fort Street Tourism Village in 2001, a facility that could accommodate a larger inflow of cruise tourists. Additionally, security concerns raised after the terrorist attacks of September 11, 2001, caused several cruise lines to redirect their ships from the Mediterranean to the Caribbean. The net result was the start of year round port calls in 2002, a major shift from the previous seasonal arrivals of ships between October and April/May.

These gains weren't consolidated and in the latter half of the decade, local delays in building a proper cruise port facility as well as a shift of cruise itineraries from the Caribbean back to other distant locations resulted in an 8.3% annual average rate of decline in cruise arrivals. Notwithstanding this however, inflows from cruise ship tourists continued to grow mainly due to the expanded marketing of on-shore tours packages.

Chart 2: Services Balance

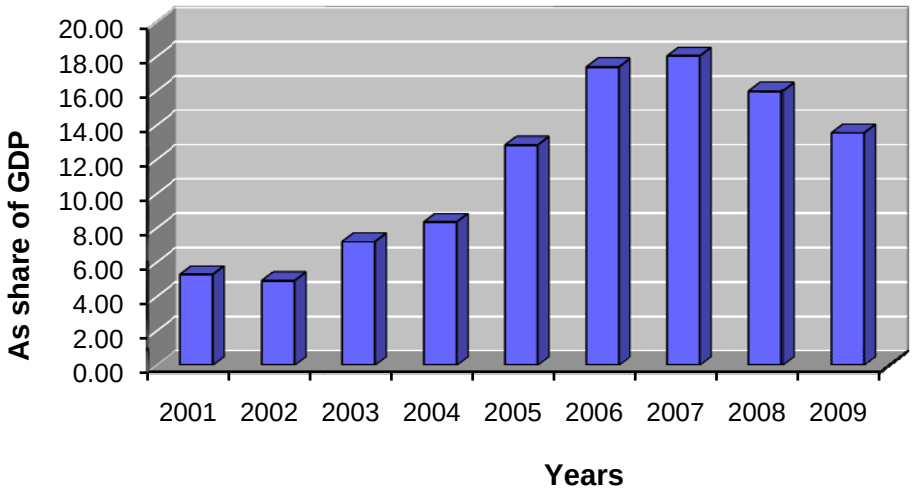
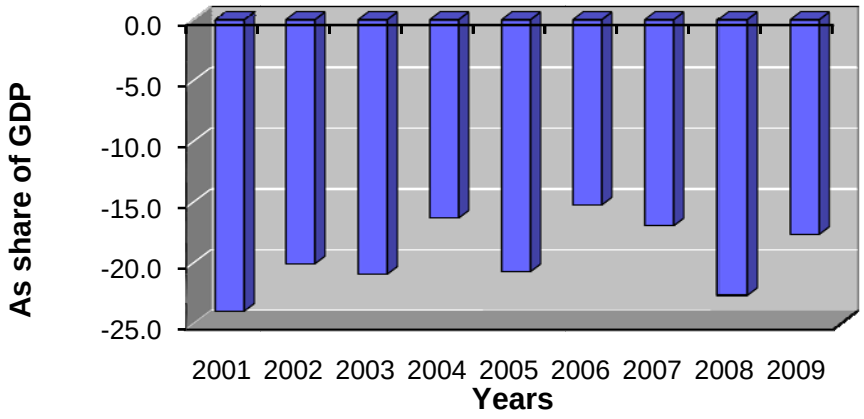


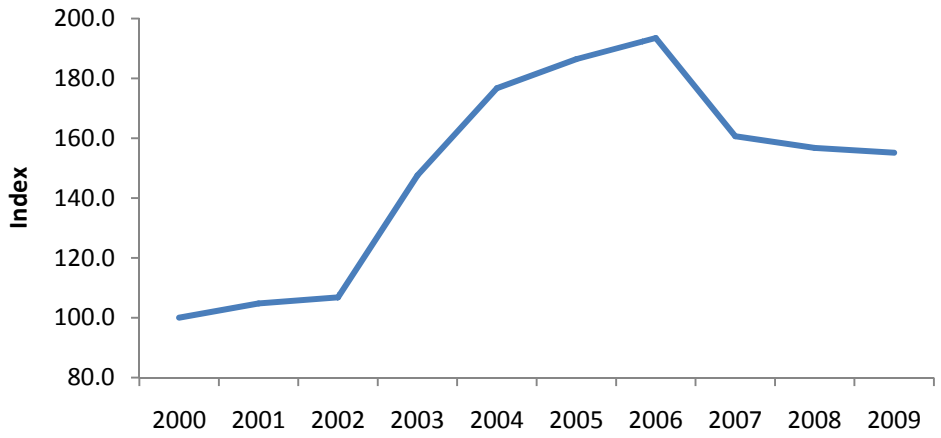
Chart 3: Trade Balance



2.2 Export Volume Index

Although the export volume indicator exhibited an upward trend over the period analysed, two distinct periods can be identified. In the first period (2000 – 2006), there was continuous growth due to higher shrimp and papaya production. From 2007 to 2009, the indicator trended downwards as agricultural production contracted in response to pest problems and adverse weather. Shrimp output contracted significantly due to the closure of the largest shrimp farm in late 2006, and in anticipation of the expiration of the Caribbean Basin Initiative (CBI) agreement, the main garment manufacturer opted to gradually reduce its production in Belize until it eventually closed down in January 2008. A positive development was the start of petroleum production in early 2006.

Chart 4: Export Volume Index



2.3 Direction of Trade

The US was Belize's primary export market even though its share of total exports fell from 50.5% in 2000 to 32.4% in 2009. The most important shift occurred in the share of exports to Central America, which grew from only 0.7% to approximately 18.4% in 2009 because of petroleum sales to Costa Rica. The share of exports to the United Kingdom remained relatively stable as this country remained the major destination for Belize's sugar and banana exports. Although the US remained the principal source of imports, its market share declined from 48.9% at the start of the decade to 34.7% in 2009. At the end of the decade, Central America's share of imports was the second highest since the Panama Free Zone was a major source for goods imported into the Commercial Free Zone (CFZ).

Table 1: Percentage Distribution of Visible Trade by Country

Percentage

	Exports			Imports		
	2000	**2005**	**2009**	**2000**	**2005**	**2009**
United States of America	50.5	50.4	32.4	48.9	39.1	34.7
Mexico	1.0	5.6	2.2	10.7	9.4	10.2
United Kingdom	29.0	23.1	31.7	2.6	1.6	1.4
Other EU	9.8	7.2	5.0	4.8	5.1	3.9
Central America	N.A	0.7	18.4	N.A	19.5	18.7
Caricom	4.2	10.5	5.4	3.1	2.4	2.0
Canada	N.A	0.1	0.4	N.A	1.3	0.9
Other	5.5	2.5	4.4	29.9	21.6	28.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Statistical Institute of Belize

3.0 Literature Review

Marsh and Tokarick (1994) posited that there is no unique measure of competitiveness and therefore no one indicator provides an explicit measurement. Comparisons of nominal effective exchange rates emerged in the 1970's following the collapse of the Bretton Woods system of fixed nominal exchange rates. The nominal effective exchange rate (NEER) which is defined as the measure of the value of a currency against a weighted average of several currencies is expressed as an index of the change in the exchange rate relative to a base period.

$$NEER = \prod (E_j)^{wjt} \qquad (1)$$

Where :

$\prod$ denotes the product of the variables

E = Price of foreign country (j) currency in terms of the home country (i) currency in period t.

W_{jt} = the appropriate trade weight for each trading partner (j) in period t.

However, the observation that fluctuations of the NEER were due to inflation differentials between countries eventually led to the adoption of the Real Effective Exchange rate (REER) as a more appropriate indicator of international trade competitiveness. The REER is obtained by deflating the NEER by a relative price or cost index and is defined as the ratio of foreign prices to domestic prices expressed in a common currency. Turner and Van't dack (1993) felt that this type of index provides valuable information concerning a country's ability to compete in the international market.

$$REER = (NEER)\frac{P_j}{P_j} \qquad (2)$$

Where: P_i = domestic price level

P_j = foreign price level

NEER = nominal exchange rate (expressed in terms of foreign currency per unit of Belizean currency)

A rise in the REER index means that the domestic currency is appreciating in value and this can occur either through an increase in the domestic price level or a fall in the foreign price level. A fall in the index signifies currency depreciation due to a lowering in the domestic price level or an increase in the foreign price level. An appreciation of the REER is likely to translate into a worsening of a country's trade balance as it is expected that consumption of its exports will be

discouraged as they become more expensive while the country's import bill should rise because these will now be relatively cheaper.

Even when a country pegs the value of its currency to another major currency (as is the case of the Belize dollar that is pegged to the US dollar) it cannot avoid fluctuations in its effective exchange rate as other major currencies are floating. Therefore, the net effect of exchange rate movements must be evaluated through some weighted index such as the REER. To calculate the latter, the following components have to be identified: the price indices to be compared, the range of foreign countries to be covered and the relative weights to be applied.

The choice of price deflators is a common issue in the calculation of the REER. Turner and Van't dack (1993) summarized the main ones to be relative export prices, consumer prices, wholesale prices, GDP deflators and unit labour costs. Maciejewski (1983) purported that a ratio of the unit production costs of the home country to the unit production costs of competitors is the ideal measure for the calculation of the REER for a price taking country like Belize. Hinkle and Montiel (1999) supported this view by noting that for countries producing primary goods (price takers) a relevant concept of competitiveness is not sale at lower prices but rather production at lower costs since this gives producers the incentive to continue making a product that is similar to others in the international market.

Industry specific indices of production costs are not available in Belize let alone for all the countries in the currency basket and in the circumstances it can be argued that proxies of cost can be found in the CPI and the GDP deflators. Turner and Van't dack (1993) argued that inputs such as labour and other production costs are linked to consumer prices. A rise in inflation indicates that the home country's producer's costs have risen relative to those of its competitors. GDP deflators take into account the cost of each unit of value added that goes into total domestic production. Therefore, an index of deflators is expected to provide some indication of developments in profitability relative to developments in competitor countries. However, a major drawback in using GDP deflators in the calculation of the REER is its timeliness as there is a significant lag in publication for both the quarterly and annual data in Belize. Bearing this in mind, the CPI will be used for it has the advantage of being available and current. The CPI is also available for a wide range of countries and is similarly constructed across countries. However, a disadvantage of using the CPI is that this indicator is subject to the influence of price controls and other distortions which may introduce "noise" into the performance of the REER indicator (Turner and Van't dack). Furthermore, a large portion of trade is in intermediate goods and therefore much of international trade does not take place at the consumer price level. The two preceding facts may diminish the usefulness of relying on a real exchange rate based on consumer prices. In the case of Belize, data for the period under review indicates that consumer goods imports accounted for 19.4% of total imports, while intermediate goods and other goods accounted for the greater share of total imports at 37.9% and 31.3%, respectively. Capital goods accounted for only 11.4% of total imports.

The development of a REER requires the identification of a set of countries for inclusion in the analysis. The currency basket is constructed by choosing those countries that are most important i in Belize's overall trade (export market and import market) and countries that compete against Belize's main export commodities (sugar, banana, shrimp, orange and grape fruit concentrate).

Since the purpose of this index is to measure Belize's overall competitiveness an appropriate weighting system must capture the three most important types of competition facing Belizean producers: (a) competition between domestic export producers and foreign competitors exporting similar products; (b) competition between the domestic producers and foreign import producers; and (c) direct competition between export producers and domestic competitors in the countries we export to.

The weighting system used by Arana (1997) employed direct trade (exports and imports), involving Belize and 13 countries. These bilateral weights only capture the relative importance of Belize's two way trade with each of these countries and therefore yield an index that incompletely describes Belize's competitive position since it excludes competition with countries that produce similar products (bananas, shrimp and citrus concentrate juices) or what is referred to as third country competition. When third country effects are taken into account, a set of multilateral weights replaces the bilateral weights. Analysis of competitiveness is strengthened when different measures of REER are also taken into account. As primary commodities generally dominate Belize's exports, a useful supplemental measure of competitiveness would be a REER that exclusively measures competition between Belize and other primary producers of the same products Belize exports. Also, due to the surge in trade in services, particularly tourism, a specially constructed exchange rate measure appropriate for tourism dominated economies would strengthen any assessment of competitiveness.

4.0 Methodology

4.1 MEASURING COMPETITIVENESS

The first index to be calculated is the composite REER which incorporates the three types of competition facing Belizean producers. It incorporates competition between domestic exporters and foreign producers who export similar products, competition between producers of import substitutes for the domestic market and foreign producers of similar products and direct competition between export producers and producers of similar products in the countries Belize trades with. The second REER indicator that will be calculated is a commodity based REER, a variant of the above composite measure that specifically zooms in on the export competitiveness of Belize's tradables. The last measure of competitiveness to be constructed is a tourism REER, based on real exchange rates vis-à-vis major competitors of Belize in the tourism sector.

4.2 REER CALCULATIONS

The process begins by first estimating Belize's Nominal Effective Exchange Rate (NEER) index which reflects the value of the Belize dollar relative to the value of the currencies of its major trading partners, with reference to a specific base period (Des Vignes and Smith). Using the geometric mean, the nominal effective exchange rate can be calculated as follows:

$$NEER= (E_1)^{w1} * (E_2)^{w2} * (E_3)^{w3} .... * (E_n)^{wn} = \prod (E_j)^{wj} \quad (3)$$

Where

Ej= Price of foreign country (j) currency in terms of the home country (i) currency expressed as an index

$\underline{w}_{j=}$ Weight for country j

The REER is obtained by deflating the NEER index using an index of relative prices and is expressed as:

$$REER_i= \prod (E_j P_i/P_j)^{wj} \quad (4)$$

Where

$REER_i$ = Real effective exchange rate index of home country i in a given period

P_i =Index of the cost (or price) indicator of home country i

P_j = Index of the cost (or price) indicator of partner country j

$w_{j=}$ Weight for country j

This formula is used to calculate the three different REER indices with each index using a different basket of countries and different weights applied to the currency of each.

4.3 SELECTION OF THE WEIGHTING SYSTEMS

4.3.1 Composite REER

The Composite REER requires the compilation of a bilateral export index that captures competition between Belizean exporters and producers of similar products that reside in those trading partners (foreign domestic producers), a bilateral import index that focuses on competition between domestic producers of import substitutes and foreign producers of those same products and a global weighted index that captures competition between domestic export producers and third country competitors who export similar products to the same markets. The overall composite weight (W_i^c), given to a particular country can be calculated by averaging the three indices.

$$W_i^c = (W_j^e + W_j^m + W_{bj})/3 \qquad (5)$$

Where W_i^c= Composite weighted Index
W_i^e= Bilateral weighted Export Index
W_i^m= Bilateral weighted Import Index
W_{bj}= Global weighted index

The formula for the Bilateral Weighted Export Index is :

$$W_j^e = X_j/\sum X_i \qquad (6)$$

Where X_j = Exports to country j
$\sum X_i$= Total Exports from Belize
W_j^e = Proportion of total exports to country j

The formula for the Bilateral Weighted Import Index is :

$$W_j^m = M_i/\sum M_i \qquad (7)$$

Where
W_j^m= Proportion of total imports from country j
M_j = Imports from country j
$\sum M_i$= Total imports of Belize

The commodity oriented global weighted index that captures competition between Belizean exporters and other exporters selling to the same markets was calculated as follows:

$$W_{ij} = \Sigma \frac{X_{bl}}{X_b} \cdot \frac{X_{jl}}{X_l} \quad (8)$$

Where: W_{ij}= weight of country j in the global trade of the primary commodities in which Belize trades

$\frac{X_{il}}{X_i}$ = share of the lth commodity in Belize's exports

$\frac{X_{jl}}{X_l}$ = share of country J in world exports of l

The first step in developing the composite weighting system was to choose the trading partners that encompassed as much of the country's trade as possible. (See Table 1 Appendix)

For the calculation of the global commodity index, it was assumed that the primary commodities in which Belize competes internationally are sugar, orange concentrate, grapefruit concentrate, shrimp, papayas and bananas. It must be pointed that all of these commodity exports enjoy preferential access into the European Union (EU), United States (US) and Caricom markets. Until 2006, the EU banana regime consisted of a series of specific tariffs, tariff preferences and quotas devised to protect producers from the Africa, Pacific and Caribbean (ACP) region from Latin American producers of "dollar bananas". The current regime consists of a single duty on third-country imports of bananas that replaces the individual quota system.

Similarly, the thirty-eight year old EU sugar regime effectively changed in 2006 when the first round of price cuts of the new trade arrangements materialized. As a member of the African, Caribbean and Pacific (ACP) nation states, Belize traditionally benefitted from preferential access to the EU market. However, these benefits were progressively reduced as the preferential sugar regime was subjected to intense pressure from World Trade Organization challenges initiated by Brazil, Thailand and Australia. In response to these pressures and also to ensure a sustainable EU market balance consistent with its international commitments, the EU implemented a 36% price cut that was phased in over a four year period starting 1 July, 2006 and ending in October 2009. These four years provided a small window within which the necessary improvements in productivity and efficiency were to be effected in order to ensure the long term viability of the local sugarcane industry. Securing additional EU market access to cushion the impact of the steep price cuts was a key requirement for the industry's survival. This was achieved by way of the EU/Cariforum Economic Partnership Agreement (EPA) that was executed on 1 January, 2008, but which came into operation at the end of September 2009 with the expiration of the EU/ACP Sugar Protocol.

The citrus industry also benefits from duty free access to the US market under the Caribbean Basin Initiative (CBI) agreement, the EU market under the various Lome agreements and to the markets of CARICOM member countries. Papaya exporters have also benefitted from duty free access to the US under the CBI agreement.

To develop the global weighting system, a system of weights based on the value of Belize's exports of these commodities was developed (appendix Table 2). Thereafter, the major global

producers of each of these commodities were identified and the share of each in world exports of the commodities was also calculated (appendix Table 3).

However, practical difficulties in obtaining exchange rate and CPI data for all the countries led to the selection of eleven countries that accounted for approximately 67% of total trade. Utilizing this new set, an adjusted composite weighing system was calculated, and this was utilized in the calculation of the composite REER index.

Table 2: Adjusted Composite Weights

Country	Composite Weights	Adjusted Composite Weights (w_j)
UNITED STATES	0.29	0.43
BRAZIL(1990=1)	0.06	0.08
UNITED KINGDOM	0.06	0.09
MEXICO	0.05	0.07
PANAMA	0.04	0.07
NETHERLAND ANTILLIES	0.04	0.06
COSTA RICA	0.03	0.05
NETHERLANDS	0.03	0.05
GUATEMALA	0.03	0.04
CHINA	0.02	0.03
JAMAICA	0.02	0.02
TOTAL	**0.67**	**1.00**

4.3.2 Commodity Based REER

The weights for the commodity based REER were derived from the global index that was calculated using those countries that accounted for the greater share of trade with Belize. Thereafter, the weights for the selected countries were re-adjusted to obtain the series that was used in the calculation of the commodity based REER.

Table 3: Weights for Commodity based REER weights

	Global Weight	Competitor Based REER weights(w_i)
UNITED STATES	0.04	0.12
COSTA RICA	0.01	0.04
NETHERLANDS	0.02	0.05
MEXICO	0.02	0.05
GUATEMALA	0.01	0.04
BRAZIL	0.16	0.43
PHILLIPINES	0.01	0.04
MALAYASIA	0.02	0.05
BELGIUM-LUX	0.04	0.11
AUSTRALIA	0.02	0.04
CHINA	0.01	0.03
TOTAL	**0.37**	**1.00**

4.3.3 Tourism Based REER

The weighting system for this REER index utilizes the same base year and includes the currencies and stay-over tourist arrival data of eight countries in the Caribbean that are considered to be Belize's main competitors in the industry.

Table 4: Tourism REER weights

Countries	Weights(w_t)
DOMINICAN REPUBLIC	0.31
MEXICO(CANCUN/COZUMEL)	0.20
BAHAMAS	0.13
JAMAICA	0.13
GUYANA	0.01
TRINIDAD & TOBAGO	0.04
NETHERLAND ANTILLES	0.13
BARBADOS	0.05
TOTAL	**1.00**

5.0 REER Index: Results, Trends and Developments

5.1 Results of REER calculations

The results of all three types of REER calculations are shown in the table below.

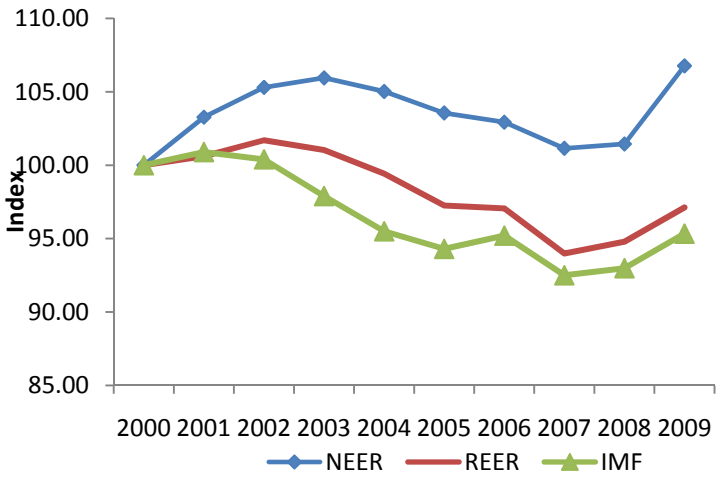
Table 5: Results of the REER calculations

Period	Composite REER	Commodity Based REER	Tourism Based REER
2000	100.0	100.0	100.0
2001	100.6	109.1	97.7
2002	101.7	115.4	99.5
2003	101.0	109.5	112.3
2004	99.4	103.9	110.3
2005	97.3	94.2	97.5
2006	97.1	89.8	99.5
2007	94.0	82.7	97.3
2008	94.8	80.2	95.5
2009	97.1	82.7	99.2

5.2 Decomposition of the Changes in the Composite REER

The results which are shown in Chart 5 illustrate that over the period 2000-2009 there have been no significant changes in Belize's real effective exchange rate. While relatively stable, the REER has generally followed the movements in the nominal exchange rate which in turn closely mirrors fluctuations in the nominal effective exchange rate of the US dollar. The REER at the end of 2009 was lower than it was at the start of the review period mainly due to declines that occurred in the years 2002-2007.

Chart 5: Composite REER, NEER and IMF REER



One method of analyzing movements in the REER is through a simple accounting decomposition of its constituent elements (the NEER, domestic inflation and the foreign level of inflation) while noting that movements are influenced not only by the domestic exchange rate and monetary policies but also by foreign inflation and exchange rates which are influenced by the policy decisions of other countries. As shown in table 6, there were three distinct periods of movements in the REER.

Table 6: Decomposition of Changes in Composite REER Index: Major Trading Partners and Competitors

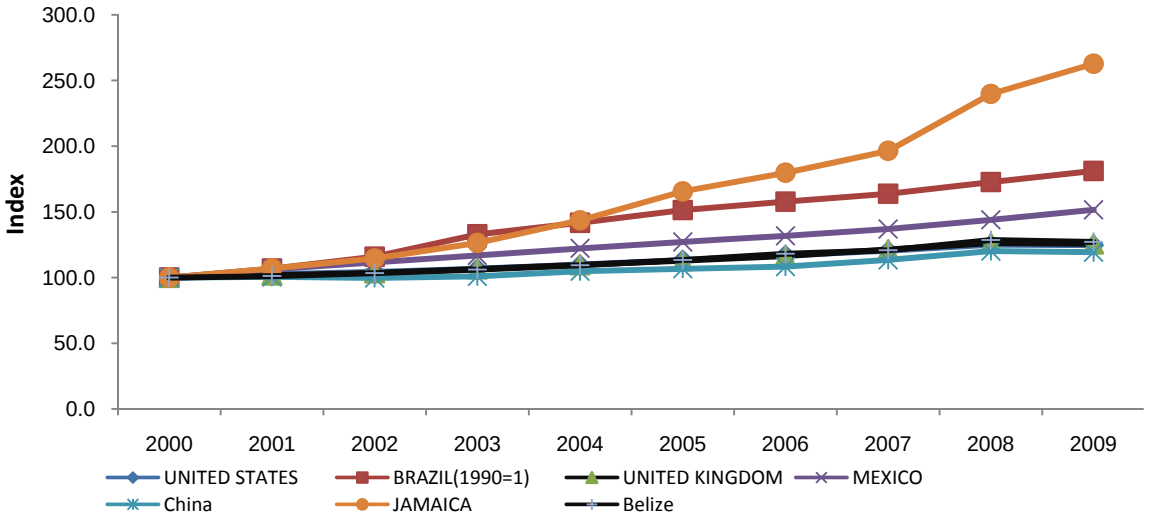
% change

Period	Change in REER	Change in NEER	Change in P_i	Change in P_j	Change in P_i – Change in P_j
2000-2009	**-2.9**	**6.9**	**27.2**	**61.4**	**-34.2**
2000-2002	**1.1**	**5.9**	**3.37**	**9.0**	**-5.63**
2003-2007	**-6.9**	**-5.0**	**13.9**	**24.2**	**-10.2**
2008-2009	**2.4**	**5.3**	**-1.1**	**3.8**	**-4.9**

P_i : domestic price level, P_j : foreign price level

Over the entire period, the composite REER depreciated by 2.9% as the rate of inflation in Belize was lower than those of its major trading partners and competitors, except for China. Thus, the impact of the inflation differential on the REER outweighed the effect exerted by the appreciation of the nominal effective exchange rate (NEER).

Chart 6: Consumer Price Index of major trade partners and competitors



Notwithstanding its overall decline since 2000 there were two periods when the REER index appreciated. Increases in the period 2000-2002 were in both nominal and real terms, with an increase in the NEER as well as a slightly higher rate of inflation in Belize relative to the other

countries in the trading basket. As shown in table 6, changes in the NEER were the main contributor as the US currency was appreciating against the major currencies in this period. This temporary increase in the REER was also a result of very expansionary domestic policies reflected in the massive growth of fiscal spending. An increase in government expenditure tends to push the real exchange rate upward as it creates pressure on non-tradables such as services.

Over the next five years, the REER depreciated by 7.5% due to a fall in the NEER combined with a faster pace of price growth in countries such as Brazil, Mexico, Costa Rica, Guatemala and Jamaica. With the general strengthening of the US dollar against the major currencies in our basket, the REER appreciated by 2.5% over the final two years as an increase in the NEER outweighed the effect of a higher rate of inflation in Belize's trading partners and competitors.

5.3 Decomposition of the Changes in the Commodity and tourism REER

The composite REER examines competitiveness on an aggregate level and is used as the main summary indicator of competitiveness. However, specific REER measures were developed to track competition for Belize's main commodity exports and tourism.

Chart 7: Alternative Measures of the REER Index

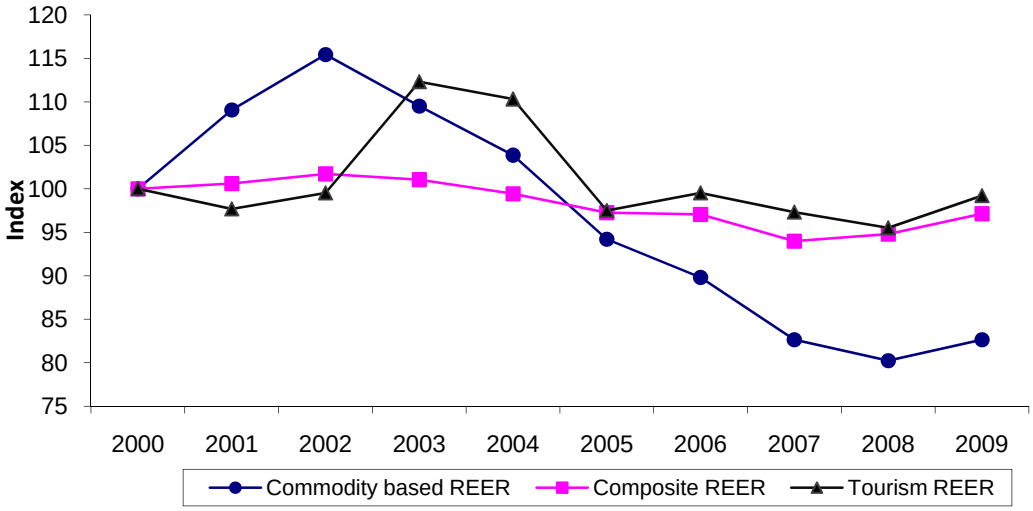


Chart 7 shows the results for the three types of REER and indicates that the commodity and tourism competitor indices follow a similar trend like the composite index but with more exaggerated fluctuations. The fluctuations of the commodity REER were strongest with a steep initial appreciation of 15.4% and subsequent depreciation of 26.7%, followed by a 3.0% appreciation. The movements in the tourism competitor REER were slightly more pronounced than the composite REER, depreciating slightly in 2001, then appreciating by 12.8% between 2002 and 2003, followed by a moderate depreciation of nearly the same magnitude as the composite REER. In all cases, the early appreciation was of a lower magnitude than the later depreciation.

The commodity REER index depreciated by 17.3% between 2000 and 2009, influenced mostly by more rapid price growth in competitor countries, while the tourism REER depreciated by

only 0.8% over the review period owing to the smaller price differential between tourism competitors and Belize.

Table 7: Decomposition of Changes in Commodity REER Index

% Change

Period	Change in REER	Change in NEER	Change in P_i	Change in P_j	Change in P_i – Change in P_j
2000-2009	-17.3	0.5	27.2	51.8	-24.6
2000-2002	15.4	23.9	3.4	9.3	-5.9
2003-2008	-26.7	-24.1	21.2	29.1	-7.9
2009	3.0	7.2	-1.1	2.8	-3.9

Table 8: Decomposition of Changes in Tourism REER Index

% Change

Period	Change in REER	Change in NEER	Change in P_i	Change in P_j	Change in P_i – Change in P_j
2000-2009	-0.8	50.8	27.2	81.0	-53.8
2000-2001	-2.3	1.8	1.1	3.5	-2.4
2002-2003	12.9	22.3	2.6	7.6	-5.0
2004-2008	-13.2	-4.8	17.6	32.8	-15.2
2009	3.9	8.9	-1.1	4.4	- 5.5

5.4 LABOUR PRODUCTIVITY AND REAL WAGES

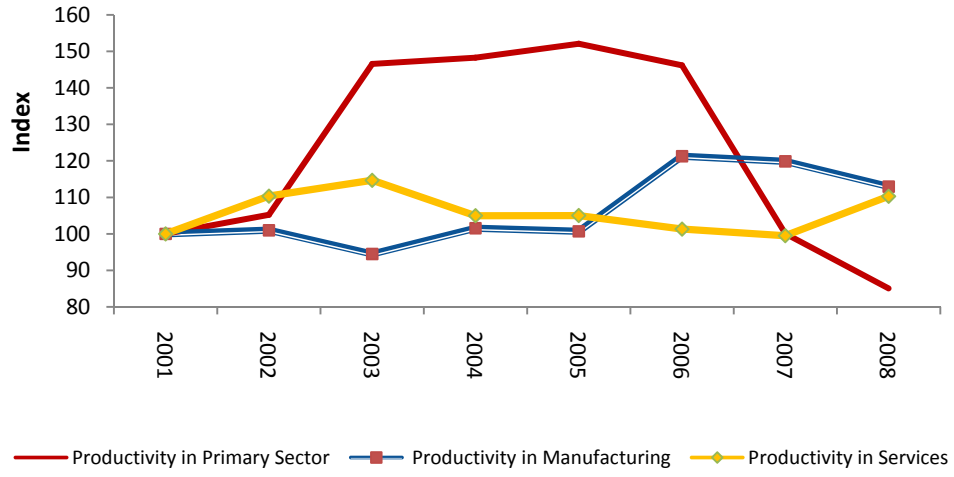
All three indicators reveal that Belize's real exchange rate has depreciated, particularly the commodity REER that focuses on the export sector. Economic literature posits that a depreciated real effective exchange rate points to gains in competitiveness. Decomposing the REER into its components should identify the factors driving competitiveness, especially at the industrial level. The changes in the NEER are mostly exogenous, since local policy makers set the domestic exchange rate but have no influence over movements of the dollar relative to other currencies in the basket.

The fixed exchange rate contributes to a low inflation environment. Therefore at the industrial level, the depreciation has been driven by the underlying, endogenous determinants of the REER such as labour productivity, wage growth and costs.

Chart 8: Labour Productivity and Real wages

Productivity increased in the early part of the decade then remained relatively stable between 2003 and 2006 and thereafter declined for the rest of the period. According to the Balassa-Samuelson effect, an increase in the productivity of traded goods relative to non-tradeables appreciates the real exchange rate since the price of non-tradeables increases relative to traded goods and pushes up the domestic price level. The graph shows that the productivity level has been generally declining, and this has coincided with the depreciation of the REER.

Chart 9: Labour Productivity and Real Wages



The primary sector had the largest increase in productivity between 2000 to 2003. It remained relatively stable from 2003 to 2006 and thereafter declined steadily. The initial sharp increase in primary sector productivity was due to the expansion of farmed fish production. The decline in primary sector productivity, which started in 2006 and persisted over the rest of the review period, was due to the closure of one of the biggest shrimp farms and the subsequent exit of

several smaller farms. Manufacturing productivity was relatively stable during the period, albeit below that of the primary sector, but jumped in 2006 due to the start of commercial petroleum operations. However, the productivity gains created by this new industry were overshadowed by downturns in other key manufacturing industries such as garments and sugar.

As of 2003, services also experienced a decline in productivity when employment started to grow at a faster rate than value added.

Chart 10: Agriculture Productivity

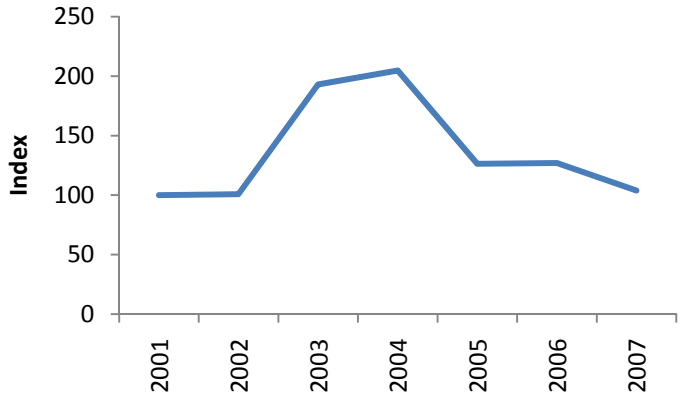


Chart 11: Fishing Productivity

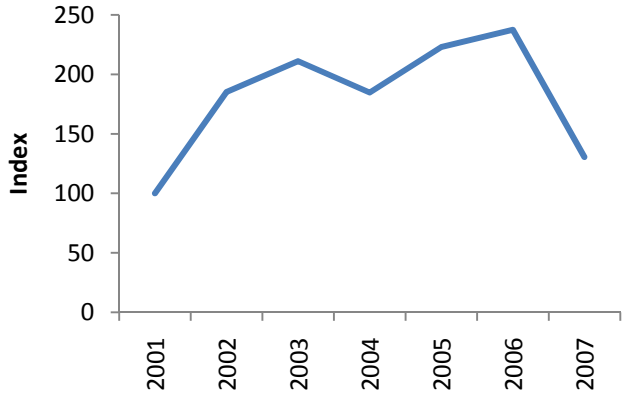


Chart 12: Manufacturing Productivity

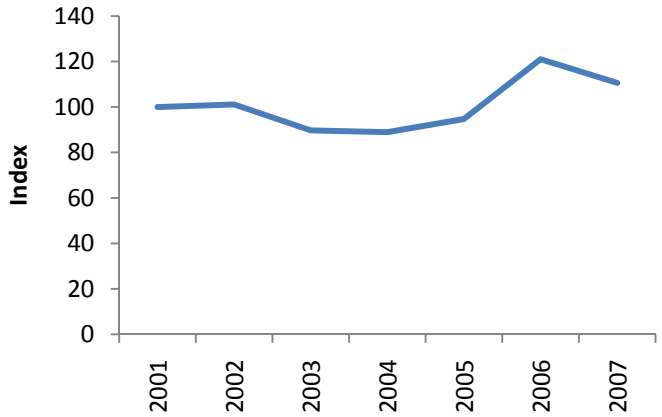
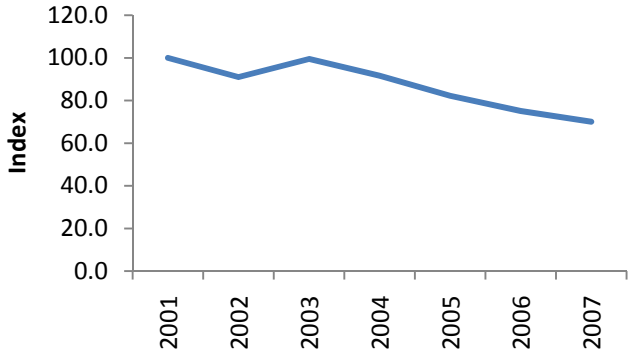


Chart 13: Tourism Productivity



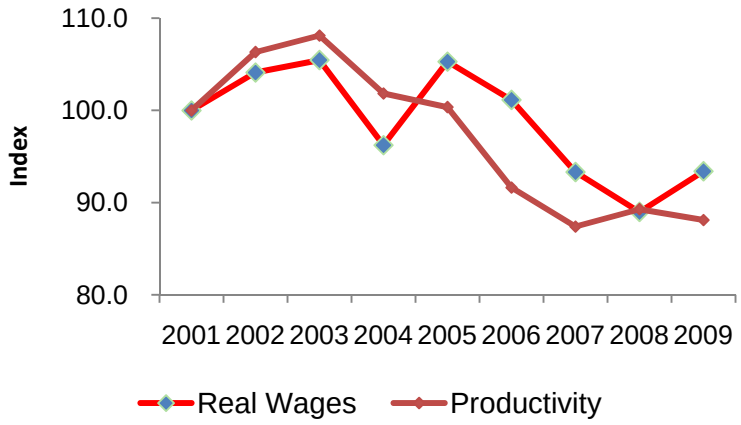
While falling productivity factored into the depreciation of the real exchange rate, competitiveness was maintained by the ability of the industrial sector to keep real wage growth below that of productivity. As stated by Freeman (1998), competitiveness improves when real wage growth stay below that of productivity growth. Labour productivity is defined as real output per worker, which is equal to the ratio between real gross domestic product and total employment (Freeman, 2008), while real wages are aggregate wages and salaries divided by the GDP value added deflator. Over the review period, labour productivity increased at a faster pace than real wage growth, which indicates a gain in competitiveness, albeit marginal. To evaluate where most of the gains in competitiveness was achieved, this data was further disaggregated into the private and public sectors.

The private sector, supplier of goods and services, was able to keep real wage growth below that of productivity and thus remained competitive throughout the period. Of note, the sharper decline in real wages in 2007 and 2008 was due to the larger inflation change relative to the previous years. In regards to the public sector, after initially being higher than real wages,

productivity began to decline in 2004 and fell below real wages in 2005, indicating that the public sector was clearly uncompetitive.

Chart 14: Private Sector Productivity

Chart 15: Public Sector Productivity



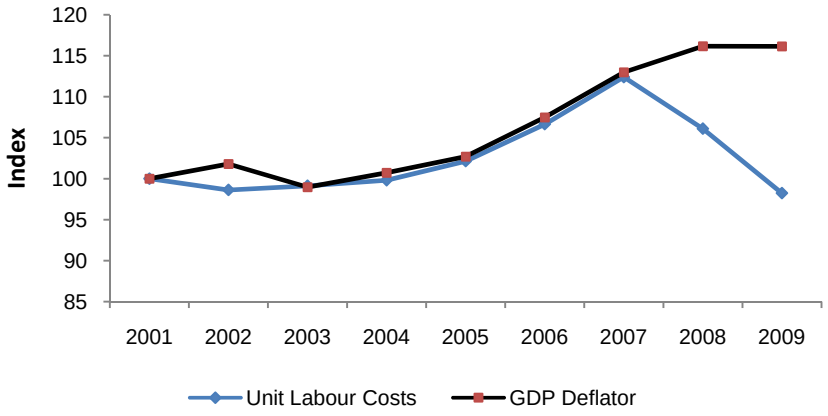
5.5 Unit Labour Costs

Since Belize is a price taker in international markets, competitiveness translates into keeping costs down and making sufficient profits to encourage more production.

To assess the profitability of production, unit labour costs (ULC), defined as total wages and salaries divided by real value added, were compared with movements in the GDP deflator

(Lipshitz and Mcdonald, 1991), which is a good proxy for profits. If aggregate unit labour costs are rising faster than the GDP deflator, this indicates a decline in the profitability of production. Chart 16 shows that unit labour costs have increased on average by 0.9% since 2001, whereas the average increase in the deflator or unit of profit was 2.2%. This implies a 1.3% increase in the profit margins of Belizean producers since 2001.

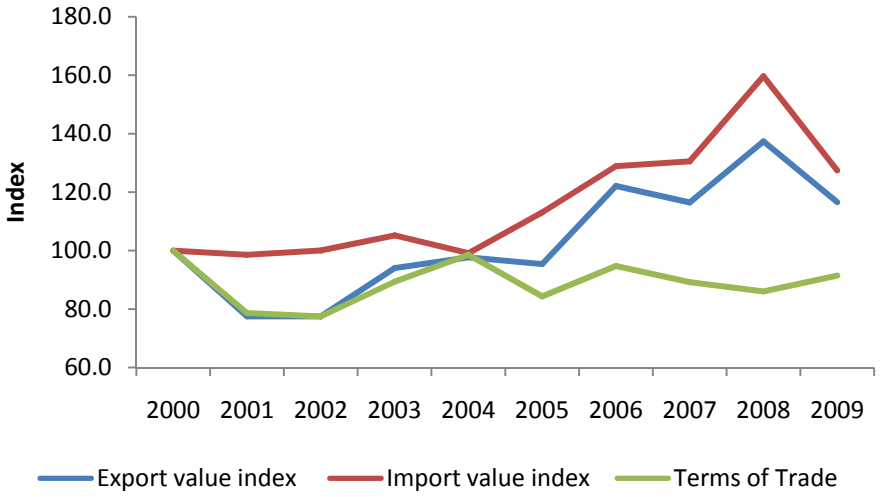
Chart 16: Unit Labour Cost and GDP Deflator



5.6 Terms of Trade

The terms of trade is a key determinant of the real exchange rate. It is an index of the ratio of a country's average export prices to its import prices and represents the export purchasing power of a country in terms of imports. During the analysis period (2000 – 2009), Belize's terms of trade generally deteriorated. As illustrated in chart 17, the terms of trade declined as import prices rose faster than the export prices of Belize's major export commodities.

Chart 17: Export and Import Value Indices



From a theoretical perspective, the impact of the terms of trade on the real exchange rate is ambiguous since its income and substitution effects operate in opposite directions. However, for commodity producing countries, the income effect generally outweighs the substitution effect as households do not have the option of substituting an imported product for a locally manufactured one. In the case of Belize, a correlation test between the REER and the terms of trade can determine the nature of the relationship between the two variables.

Consistent with expectations, the REER and the terms of trade are positively correlated with a correlation coefficient of 0.50448. This indicates that a positive shock to Belize's terms of trade (an improvement) will result in an appreciation of the REER. Conversely, deterioration in the terms of trade results in a depreciation of the real exchange rate similar to what Belize experienced over the review period.

Table 9: Correlation Coefficients between REER and Terms of Trade

Covariance Analysis:Ordinary **Included Observations:20** **Sample: 1990-2009**	
Correlation **t-statistic** **Probability**	**REER** **Terms**
REER	1.000
Terms of Trade	0.50448 1.000 2.478673 0.0233

Furthermore, the IMF (Country Report, 2006) estimated a long run relationship between the REER and its fundamental explanatory variables, one of which was the terms of trade. The results supported the expected relationship between the REER and the terms of trade in that a rise in import prices relative to export prices would lead to a depreciation of the REER.

6.0 Implications of REER

The importance of the REER depends on the extent to which it can aid in explaining changes in the current account of the balance of payments with particular emphasis on the trade balance. It is therefore important to determine if a relationship exists between the REER and exports, and this was done by statistically correlating the two in order to provide more information on the relationship.

The table below shows the results of the statistical correlation test between the REER and exports.

Table 10: Correlation Coefficients between Exports and REER

Covariance Analysis: Ordinary **Included Observations:20** **Sample: 1990-2009**		
Correlation **t-statistic** **Probability**	**Exports**	**REER**
Exports	1.000	
REER	-0.444187 -2.103418 0.0498	1.000

Consistent with expectations, the REER and exports are negatively correlated with a correlation coefficient of -0.444. This indicates that a positive shock to Belize's REER (an appreciation) will result in an opposite movement in the level of exports. Thus, an appreciation of the currency should lead to a fall in the country's exports of goods and services which would equate to a worsening of the current account balance.

6.1 Industry Impact of REER

On a more disaggregated level, the impact of movements of the REER on individual industries can be gauged. Over the study period, the export volume of the country's main commodities rose by 5.9%, despite downturns in the period 2007-2009, which coincided with the appreciation of the REER. However, in analysing volume growth by export product, it is more difficult to assess the direct impact of exchange rate developments on production because of the effect of other factors such as weather related shocks as well as structural and operational issues unique to each industry.

6.1.1 Sugar

Despite a depreciated REER, the volume of sugar exports declined by 2.7% over the study period due to production inefficiencies and damages resulting from two hurricanes. On the revenue side, the depreciation of the REER has benefitted the sugar industry as it relates to exports to Europe, its main market, due to the movements of the US dollar against the Euro.

The industry's sales to Europe are valued in Euros, so earnings have been boosted by the depreciation of the US dollar against the Euro. The industry has been able to offset the effects of sugar price cuts instituted since 2006 through exchange rate gains and by taking advantage of production shortfalls of other sugar producers.

While favorable exchange rate movements are beneficial, the industry's profitability should be sustained by an improvement in the quality and quantity of sugar produced.

Table 11: Productivity Indicators of Sugar Producing Countries in 2009

Indicator	Belize	Mexico	Brazil	Mauritius	India	South Africa
Sugar Cane/Hectare	44.3	64.2	77.0	71.9	64.5	59.4
Sucrose in Cane (%)	12.32	13.96	14.0	12.1	11.5-15.0	13.0
Factory Efficiency (tons cane/tons sugar)	9.93	11.6	12.6	10.7	10.4	13.0

Source: Belize Sugar Industries, International Sugar Organization

International parameters used to measure the competitiveness of sugar producers include field yield (sugarcane/hectare), factory efficiency (Tons Cane/Tons Sugar ratio) and agro-industrial yield (sucrose in cane) (Aguilar, 2010).

The tons cane/tons sugar indicator shows that the factory is competitive internationally and this could be a result of recent capital investments. Additionally, the agro-industrial yield indicator compares favourably with other major world producers highlighting that climatic factors and soil conditions make northern Belize ideal for sugar cultivation. However, this natural advantage has

been overshadowed by field inefficiencies such as poor husbandry practices and the slow rate of field replanting.

6.1.2 Banana

Export volume generally increased over the period 2000 to 2009, except for downturns in 2001 due to Hurricane Irene and 2007 due to Sigatoka disease. The banana industry has also benefitted from the overall depreciation of the US dollar against the Euro as profit margins have been buoyed by the favourable exchange rate. However, competitive pressures are likely to intensify with changing trade policies (such as the reduction of most favoured nation (MFN) tariffs) governing the banana industry, and the level of exchange rate will be just one factor that will determine its competitiveness. An increase in productivity of current acreage is fundamental for the industry to remain competitive.

With respect to the other banana producing countries in Central America, Belize is naturally disadvantaged because of the quality of the soil in the banana producing areas. Farms in Central America produce up to 3,000 boxes/ acre, while the minimum amount that a farm can produce to be considered financially viable is 1,200boxes/acre. In contrast, the current average production of Belize's farms is approximately 600boxes/acre (Banana Growers Association, 2008).

However, industry stakeholders believe that through improved agronomic practices and field investments productivity can be improved to approximately 900 boxes/acre.

6.1.3 Citrus

The citrus industry benefits from preferential access to the US and EU markets, but earnings depend heavily on international juice price fluctuations. The industry's competitiveness therefore depends less on exchange rate issues and more on the volume produced, product quality and the scope for expanding the line of value added products to increase overall profit margins.

6.1.4 Tourism

The domestic tourism sector has a somewhat diversified revenue base (USA, Europe, UK and Canada), but the US remains the major source market.

Belize's tourism strategy originally focused on the low volume and high end niche eco-tourism market. However, over the past several years, the tourism product was broadened to encompass the mass cruise tourism market. The lopsided bargaining power of the major cruise lines and the rapid growth in cruise tourism over the review period has highlighted the importance of a competitive exchange rate and the need for diversification of the tourism product to boost revenues. However, the development of a sustainable tourism product, requires that the focus be on the stay-over segment, which is the back-bone of the industry as it generates more foreign exchange while its negative impact on the country's resources is smaller than that of the cruise segment. While price competitiveness has emerged as a major concern for the industry, its future growth is also dependent on effectively addressing other issues such as quality assurance measures, zoning laws and crime.

The industry analyses indicated that the development and growth prospects for Belize's industries are dependent on various factors and not just the real exchange rate. Although the overall composite REER may be a useful indicator of the economy-wide impact of changes in competitiveness, this may be of less direct relevance for individual industries, which tend to concentrate trade in particular currencies. For such industries, changes in the bilateral real exchange rates are likely to have a greater impact than a change in the overall trade weighted composite REER. The bilateral real exchange rate trends experienced by individual industries will influence their investment decisions and strategies to expand sales to a certain markets.

Conclusion

There is no single definitive methodology to estimate the real exchange rate as many approaches utilize different price indices, weighting schemes and baskets of countries. The choice of indicator is usually a compromise between an ideal measure and what is practical, given data availability. Recognizing that a competitiveness index seeks to capture a country's ability to sell its products on international markets, it was felt that the focus for Belize should be on domestic costs. Data limitations led to the Consumer Price Index being used as a proxy to capture underlying cost trends. The weighting scheme, another important aspect of the index, took into consideration the type of international traded goods competition to be measured between Belizean exporters and foreign domestic producers, Belizean exporters and third country exporters of the same products, and Belizean import substitution producers and foreign exporters to the country. A composite weighting system was designed that took into account all three types of competition.

Overall, the REER indicated that Belize's tradable sector was at present more competitive than a decade ago due to its lower inflation rate, compared to other countries in the trade basket, as well as the slower growth of wage levels relative to productivity. This was also supported by two alternative indicators that took into consideration competition exclusively between competitor countries exporting the same commodities as Belize and competitors in tourism. Although these alternative indicators followed a similar path as the composite REER, their fluctuations were greater in magnitude, with the commodity competitor based REER depreciating the most during the years, 2003 to 2008.

In relation to the components of the REER, the NEER is exogenous and therefore outside the control of domestic policymakers. Furthermore, our fixed exchange rate system supports a low inflation environment. Therefore to address competitiveness, policymakers need to focus on the underlying factors of productivity and wage growth, as well as social and administrative costs that can stifle productivity.

For a fixed exchange rate economy like Belize, the growth in productivity, prices and employment must be such that labour productivity always outstrips wage growth. In this regard, timely statistics on wages and employment are needed to effectively monitor the labour market as well as productivity trends in the economy.

Social and administrative factors influence prices and competitiveness. A transparent tax and customs system would foster a more equitable business environment and spur domestic competition. An effective policy against crime, a major operating cost to any business (in terms of security), is imperative to promote competitiveness.

While the depreciation of the REER has been beneficial to certain industries, these industries still require essential structural reforms to improve productivity and, where the opportunity arises, to broaden their export base through value added products. Entrepreneurs should look beyond the traditional export markets (US and Europe) to grasp business opportunities in CARICOM, Asia and Latin America.

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APPENDICES

Table 1: Construction of Composite Weights

Countries	Export Weights	Import Weights	Global Weight	Composite Weight
UNITED STATES	0.42	0.41	0.04	0.29
UNITED KINGDOM	0.17	0.01		0.06
COSTA RICA	0.08	0.01	0.01	0.03
NETHERLANDS	0.06	0.02	0.02	0.03
JAMAICA	0.04	0.01		0.02
MEXICO	0.03	0.10	0.02	0.05
FINLAND	0.03	0.02		0.02
PORTUGAL	0.03			0.01
TRINIDAD & TOBAGO	0.03	0.01		0.01
PANAMA	0.03	0.10	0.00	0.04
SPAIN	0.02		0.01	0.01
JAPAN	0.01	0.02		0.01
EL SALVADOR	0.01	0.02		0.01
DOMINICAN REPUBLIC	0.01		0.00	0.00
GUATEMALA	0.01	0.07	0.01	0.03
BARBADOS	0.01			0.00
GUYANA	0.00			0.00
FRANCE	0.00			0.00
NETHERLAND ANTILLIES	0.00	0.11		0.04
HONDURAS	0.00	0.01	0.00	0.01
GERMANY,FEDL.REP.OF	0.00		0.01	0.00
DOMINICA	0.00			0.00
CHINA		0.04	0.01	0.02
CANADA		0.01	0.01	0.01
BRAZIL(1990=1)		0.01	0.16	0.06
BELGIUM-LUX			0.04	0.01
AUSTRALIA			0.02	0.01
PHILLIPINES			0.01	0.00
MALAYSIA			0.02	0.01
OTHER	0.00	0.02	0.59	0.21
TOTAL	**1.0**	**1.0**	**1.0**	**1.0**

Table 2: Belize Commodity Export Weights

Commodities	Export Value *	Weights
Sugar	100.1	0.18
Orange Concentrate	94.9	0.17
Grapefruit Concentrate	25.2	0.05
Shrimp	68.1	0.13
Papayas	31.0	0.06
Bananas	50.3	0.09
Total	**543.4**	

* Export Value for 2006

Table 3: Global Weighting for Main Commodity Producers

	Commodities					
Countries	**Sugar**	**Orange Concentrate**	**Grapefruit Concentrate**	**Shrimp**	**Papayas**	**Bananas**
Brazil	0.39	0.45			0.17	0.02
Costa Rica						0.14
Colombia						0.11
Ecuador						0.37
Panama						0.03
Phillipines						0.14
Dom Rep						0.01
Mexico		0.01			0.32	
Malaysia					0.30	
USA		0.03	0.69	0.05		
China				0.10		
Norway				0.06		
Thailand				0.06		
Denmark				0.05		
Canada				0.05		
Chile				0.04		
Vietnam				0.04		
Belgium-Lux		0.20	0.15			
Argentina			0.01			
Germany		0.06				
Netherlands		0.12				
Spain		0.02		0.03		
Italy		0.03				
EU	0.18					
Australia	0.09					
Guatemala	0.03					0.09
Honduras						0.04
India	0.03					
South Africa	0.03					
Cuba	0.03					

Table 4: Global Weights

	Commodities						
Countries	**Sugar**	**Orange Concentrate**	**Grapefruit Concentrate**	**Shrimp**	**Papayas**	**Bananas**	**Average**
Brazil	0.07	0.08	0.00	0.00	0.01	0.00	0.16
Costa Rica	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Colombia	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Ecuador	0.00	0.00	0.00	0.00	0.00	0.03	0.03
Panama	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phillipines	0.00	0.00	0.00	0.00	0.00	0.01	0.01
Dom Rep	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	0.00	0.00	0.00	0.00	0.02	0.00	0.02
Malaysia	0.00	0.00	0.00	0.00	0.02	0.00	0.02
USA	0.00	0.01	0.03	0.01	0.00	0.00	0.04
China	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Norway	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Thailand	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Denmark	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Canada	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Chile	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vietnam	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Belgium-Lux	0.00	0.03	0.01	0.00	0.00	0.00	0.04
Argentina	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Germany	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Netherlands	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Spain	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Italy	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EU	0.03	0.00	0.00	0.00	0.00	0.00	0.03
Australia	0.02	0.00	0.00	0.00	0.00	0.00	0.02
Guatemala	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Honduras	0.00	0.00	0.00	0.00	0.00	0.00	0.00
India	0.01	0.00	0.00	0.00	0.00	0.00	0.01
South Africa	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Cuba	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Calculation of Composite REER

Table 5: Exchange Rate Indices Ej (2000=100)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Brazil(1990=1)	100.0	128.9	159.6	168.1	159.8	133.0	118.9	106.4	100.2	109.1
United Kingdom	100.0	105.3	101.0	92.8	82.8	83.3	82.3	75.7	81.8	96.9
Mexico	100.0	98.8	102.1	114.1	119.4	115.3	115.3	115.6	117.7	142.9
Panama	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Netherland Antilles	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Costa Rica	100.0	106.7	116.8	129.4	142.1	155.0	165.9	167.6	170.8	186.0
Netherlands	100.0	103.0	97.9	81.6	74.2	74.1	73.4	67.3	62.9	66.3
Guatemala	100.0	101.2	100.8	102.3	102.4	98.3	97.9	98.8	97.4	105.1
China	100.0	100.5	99.7	100.9	104.8	106.7	108.3	113.5	120.2	119.4
Jamaica	100.0	107.7	113.4	135.2	143.3	145.9	154.0	162.0	170.4	205.8

Table 6: Consumer Price Indices for Main Trading Partners ($P_{j)}$ and Belize (P_i)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	100.0	102.8	104.5	106.8	109.7	113.4	117.1	120.4	125.0	124.6
Brazil(1990=1)	100.0	106.8	115.9	132.9	141.7	151.4	157.8	163.8	172.7	181.2
United Kingdom	100.0	101.8	103.5	106.5	109.7	112.8	116.4	121.3	126.2	125.5
Mexico	100.0	106.3	111.7	116.8	122.3	127.1	131.8	137.0	144.0	151.6
Panama	100.0	100.3	101.3	101.7	101.9	105.1	107.3	111.8	121.6	124.5
Netherland Antilles	100.0	101.8	102.2	103.9	105.3	109.6	113.1	116.5	124.5	126.7
Costa Rica	100.0	111.2	121.4	132.9	149.3	169.9	189.3	207.1	234.8	253.3
Netherlands	100.0	104.5	107.6	109.9	111.2	112.1	114.1	116.2	119.1	120.6
Guatemala	100.0	107.6	116.3	122.6	131.7	142.8	152.1	161.8	182.2	185.6
China	100.0	100.5	99.7	100.9	104.8	106.7	108.3	113.5	120.2	119.4
Jamaica	100.0	107.0	114.6	126.4	143.6	165.6	179.8	196.5	239.8	262.8
	100.0	101	103	106	109	113	118	121	129	127

Table 7: Real Bilateral Exchange Rates [$(P_i/P_j) \times E_j \times 100$]

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	100	98.4	98.9	99.3	99.7	99.9	101	100	103	102
Brazil(1990=1)	100	122	142	134	123	99.6	89	78.5	74.6	76.6
United Kingdom	100	105	101	92.4	82.5	83.7	83.5	75.5	83.4	98.2
Mexico	100	94	94.5	104	107	103	103	102	105	120
Panama	100	101	102	104	107	108	110	108	106	102
Netherland Antilles	100	99.3	101	102	104	103	104	104	103	100
Costa Rica	100	97	99.4	103	104	103	104	97.8	93.5	93.4
Netherlands	100	99.7	94.1	78.8	73	74.9	76	70	67.9	70
Guatemala	100	95.2	89.6	88.5	85	78	76.1	73.8	68.7	72
China	100	101	103	106	109	113	118	121	129	127
Jamaica	100	102	102	113	109	99.8	101	99.7	91.4	99.6

Table 8: Weighted Real Bilateral Exchange Rates [$(P_i/P_j) \times E_j \times 100]^{w_j}$

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.2	7.2
Brazil(1990=1)	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5
United Kingdom	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Mexico	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Panama	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.3
Netherland Antilles	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Costa Rica	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Netherlands	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Guatemala	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
China	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Jamaica	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
REER[1]	100.0	100.8	102.1	101.4	99.7	97.3	96.9	93.7	94.5	96.8

[1]REER in 2000= $\prod [(P_i/P_j) \times E_j \times 100]^{w_j}$ = 7.1 x 1.6 x 1.5 x1.4 x 1.3 x 1.3 x 1.3 x 1.3 x 1.2 x 1.1 x 1.1= 100.0

Calculation of Competitor Based REER

Table 9: Exchange Rate Indices Ej (2000=100)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Brazil	100.0	128.9	159.6	168.1	159.8	133.0	118.9	106.4	100.2	109.1
Phillipines	100.0	115.4	116.8	122.7	126.8	124.6	116.1	104.4	100.6	107.9
Mexico	100.0	98.8	102.1	114.1	119.4	115.3	115.3	115.6	117.7	142.9
Malaysia	100.0	100.0	100.0	100.0	100.0	99.7	96.5	90.5	87.8	92.8
Belgium-Lux	100.0	103.0	97.9	81.6	74.2	74.1	73.4	67.3	62.9	66.3
Costa Rica	100.0	106.7	116.8	129.4	142.1	155.0	165.9	167.6	170.8	186.0
Netherlands	100.0	103.0	97.9	81.6	74.2	74.1	73.4	67.3	62.9	66.3
Guatemala	100.0	101.2	100.8	102.3	102.4	98.3	97.9	98.8	97.4	105.1
China	100.0	100.5	99.7	100.9	104.8	106.7	108.3	113.5	120.2	119.4
Australia	100.0	112.5	107.1	89.8	79.2	76.3	77.3	69.6	69.4	74.7

Table 10: Consumer Price Indices for Main Competitors ($P_{j)}$

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	100.0	102.8	104.5	106.8	109.7	113.4	117.1	120.4	125.0	124.6
Brazil	100.0	106.8	115.9	132.9	141.7	151.4	157.8	163.8	172.7	181.2
Phillipines	100.0	106.8	110.0	113.8	120.6	129.8	137.9	141.8	155.0	160.0
Mexico	100.0	106.3	111.7	116.8	122.3	127.1	131.8	137.0	144.0	151.6
Malaysia	100.0	101.4	103.3	104.3	105.9	109.0	112.9	115.2	121.5	122.2
Belgium-Lux	100.0	102.5	104.2	105.8	108.0	111.0	113.0	115.1	120.3	120.1
Costa Rica	100.0	111.2	121.4	132.9	149.3	169.9	189.3	207.1	234.8	253.3
Netherlands	100.0	104.5	107.6	109.9	111.2	112.1	114.1	116.2	119.1	120.6
Guatemala	100.0	107.6	116.3	122.6	131.7	142.8	152.1	161.8	182.2	185.6
China	100.0	100.5	99.7	100.9	104.8	106.7	108.3	113.5	120.2	119.4
Australia	100.0	104.4	107.5	110.5	113.1	116.1	120.2	123.0	128.4	130.7

Table 11: Real Bilateral Exchange Rates [$(P_i/P_j) \times E_j \times 100$]

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	100.0	98.4	98.9	99.3	99.7	99.9	100.9	100.4	102.9	102.1
Brazil	100.0	122.0	142.4	134.2	123.3	99.6	89.0	78.5	74.6	76.6
Phillipines	100.0	109.3	109.7	114.3	115.0	108.8	99.5	89.0	83.5	85.7
Mexico	100.0	94.0	94.5	103.6	106.7	102.8	103.3	102.0	105.1	119.9
Malaysia	100.0	99.8	100.1	101.7	103.2	103.6	101.0	94.9	92.9	96.5
Belgium-Lux	100.0	101.6	97.1	81.8	75.1	75.6	76.8	70.7	67.2	70.2
Costa Rica	100.0	97.0	99.4	103.2	104.1	103.4	103.5	97.8	93.5	93.4
Netherlands	100.0	99.7	94.1	78.8	73.0	74.9	76.0	70.0	67.9	70.0
Guatemala	100.0	95.2	89.6	88.5	85.0	78.0	76.1	73.8	68.7	72.0
China	100.0	101.1	103.4	106.1	109.3	113.3	118.1	120.9	128.6	127.2
Australia	100.0	109.0	102.9	86.2	76.5	74.4	76.0	68.4	69.5	72.6

Table 12: Weighted Real Bilateral Exchange [$(P_i/P_j) \times E_j \times 100]^{w_i}$

Country	2000[1]	2001	2002	2003	2004	2005	2006	2007	2008	2009
United States	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Brazil	7.4	8.0	8.6	8.4	8.1	7.3	7.0	6.6	6.5	6.6
Phillipines	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Mexico	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Malaysia	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Belgium-Lux	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Costa Rica	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Netherlands	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Guatemala	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
China	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Australia	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

[1]REER in 2000= $\prod [(P_i/P_j) \times E_j \times 100]^{w_j}$ = 1.7 x 7.4 x 1.2 x1.3 x 1.2 x 1.7 x 1.2 x 1.3 x 1.2 x 1.2 x 1.2= 100.0

Calculation of Tourism Based REER

Table 13: Exchange Rate Indices Ej (2000=100)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dominican Republic	100.0	103.3	113.4	187.8	256.6	185.3	203.3	202.6	204.8	219.5
Mexico(Cancun/Cozumel)	100.0	98.8	102.1	114.1	119.4	115.3	115.3	115.6	117.7	142.9
Bahamas	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Jamaica	100.0	107.7	113.4	135.2	143.3	145.9	154.0	162.0	170.4	205.8
Guyana	100.0	102.7	104.6	106.3	108.7	109.6	109.8	110.9	111.6	111.8
Trinidad and Tobago	100.0	98.9	99.2	99.9	100.0	100.0	100.2	100.4	99.8	99.8
Netherland Antilles	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Barbados	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 14: Consumer Price Indices for Main Tourism Competitors ($P_{j)}$

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dominican Republic	100.0	108.9	114.6	146	221.2	230.4	247.9	263.1	291.1	295.4
Mexico(Cancun/Cozumel)	100.0	106.3	111.7	116.8	122.3	127.1	131.8	137	144	151.6
Bahamas	100.0	102.0	104.3	107.4	108.5	110.2	112.8	115.6	120.9	123.3
Jamaica	100.0	107	114.6	126.4	143.6	165.6	179.8	196.5	239.8	262.8
Guyana	100.0	102.6	108.1	114.6	119.9	128.2	136.7	153.5	165.9	170.8
Trinidad and Tobago	100.0	105.5	109.9	114.1	118.3	126.5	137	147.8	165.6	177.2
Netherland Antilles	100.0	101.8	102.2	103.9	105.3	109.6	113.1	116.5	124.5	126.7
Barbados	100.0	93.83	102.7	104.4	105.8	112.3	120.5	125.3	135.5	140.5

Table 15: Real Bilateral Exchange Rates [(P_i/P_j) x E_j x100]

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dominican Republic	100	95.93	102.3	136.5	126.8	91.12	96.86	93.09	90.49	94.5
Mexico(Cancun/Cozumel)	100	93.98	94.5	103.6	106.7	102.8	103.3	102	105.1	119.9
Bahamas	100	99.17	99.11	98.77	100.8	102.8	104.7	104.6	106.4	103.1
Jamaica	100	101.9	102.3	113.5	109.1	99.81	101.2	99.67	91.37	99.61
Guyana	100	101.2	99.98	98.4	99.14	96.88	94.88	87.36	86.53	83.3
Trinidad and Tobago	100	94.84	93.29	92.9	92.41	89.58	86.4	82.14	77.53	71.64
Netherland Antilles	100	99.33	101.1	102.1	103.8	103.4	104.4	103.8	103.3	100.4
Barbados	100	106.6	97.37	95.79	94.52	89.05	82.99	79.81	73.78	71.18

Table 16: Weighted Real Bilateral Exchange $[(P_i/P_j) \times E_j \times 100]^{w_t}$

Country	2000[1]	2001	2002	2003	2004	2005	2006	2007	2008	2009
Dominican Republic	4.1	4.1	4.2	4.6	4.5	4.0	4.1	4.1	4.0	4.1
Mexico(Cancun/Cozumel)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6
Bahamas	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9
Jamaica	1.9	1.9	1.9	1.9	1.9	1.8	1.9	1.8	1.8	1.8
Guyana	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Trinidad and Tobago	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Netherland Antilles	1.8	1.8	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.8
Barbados	1.2	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2

[1]REER in 2000= $\prod [(P_i/P_j) \times E_j \times 100]^{w_j}$ = 4.1 x 2.5 x 1.8 x1.9 x 1.0 x 1.2 x 1.8 x 1.2 = 100.0