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EXCHANGE RATE MISALINGMENT IN SELECTED CARIBBEAN COUNTRIES

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Exchange Rate Misalignment in Selected Caribbean Countries

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ABSTRACT: This paper investigates whether the real effective exchange rates (REER) for Barbados, Jamaica and Trinidad over the period 1970-2001 are over or undervalued. A long run cointegrating regression of the REER and five fundamental variables is estimated, and the degree of over or undervaluation is obtained by comparing the actual REER to the equilibrium REER value. The paper finds that the actual REER for Barbados and Jamaica are currently above the equilibrium REER, while Trinidad and Tobago's REER is below the level it would have been in equilibrium.

Keywords: Real exchange rates; Equilibrium exchange rate.

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1. Introduction

The equilibrium REER (Real Effective Exchange Rate) is defined as the rate that achieves internal as well as external balance. It is generally accepted in the literature that maintaining the correct REER promotes economic welfare, while maintaining the real exchange rate at the "incorrect" level (a value considerably different from its long run equilibrium) reduces a country's welfare. This occurs since disequilibrium gaps send incorrect signals to economic agents, and thereby result in greater economic instability.

There are two main approaches used to derive the equilibrium REER – the fundamental equilibrium exchange rate (FEER) approach, and the behavioural equilibrium exchange rate (BEER) technique. The FEER framework, popularised by Williamson (1994), attempts to derive a REER that is consistent with internal (full employment) as well as external (a sustainable current account position) equilibrium. The degree of exchange rate misalignment is, therefore, calculated as the difference between the actual REER, and the FEER derived from sustainable values of the fundamental variables. In contrast, the BEER approach first estimates a long-run behavioural model of the REER, and then calculates the degree of exchange rate misalignment as the difference between the actual and the predicted REER, based on the current values of the fundamental variables (see Clark and MacDonald, 2000). In this study, the BEER approach is employed since the calculation of the FEER is usually quite difficult to implement in practice, given that it requires the researcher to make normative judgements about the desirable values of the fundamental variables (for a comparison of both approaches see Clark and MacDonald, 1998).

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The fundamentals are those real variables that play a key role in the determination of the country's internal and long-run sustainable external position. Although the equilibrium real exchange rate is a function of real variables only, the actual real exchange rate responds both to real and monetary variables. Therefore, the actual real rate does not have to be always equal to its equilibrium value. Indeed, it will often depart from its steady state in the short-run due to temporary changes in real variables or economic shocks (ex. a spike in oil prices). However, other types of deviations, such as the adoption of monetary and fiscal policies that are inconsistent with the chosen nominal exchange rate regime, can generate large and persistent differences between actual and equilibrium real exchange rates. These large departures are referred to as misalignment of the real exchange rate (see MacDonald, 1997; Edwards, 1987).

The purpose of this paper is to assess whether the real effective exchange rate (REER) for Barbados, Jamaica and Trinidad and Tobago are misaligned. This analysis comes against the backdrop of a recent agreement for monetary union with the Caribbean Community and Common Market (CARICOM)[1] (see Farrell and Worrell, 1994 for further details). One of the criteria for accession to this union calls for the maintenance of an unchanged U.S. dollar value of member country's currencies for at least thirty-six consecutive months. However, many of the floating exchange rate economies have experienced some difficulty in achieving this accession criterion, since it assumes that the REER for each prospective member is at, or relative close to, its equilibrium value and therefore has no tendency to change. The results

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[1] The member countries of CARICOM are: Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago.

presented in this study can aid policymakers in the various territories in understanding the stochastic process of the REER, and the key factors, which lead to misalignment.

The remainder of this study is arranged as follows. The next section presents a brief review of the previous Caribbean studies. Section 3 gives the methodological approach and data employed, while Section 4 presents the empirical results. Section 5 concludes with some summary remarks.

2. A Brief Review of the Caribbean Literature

Lewis (1972) provided one of the earliest discussions of the concept of a regional equilibrium exchange rate. The author noted that most regional currencies were misaligned, since the money costs of production, in terms of wages, were too high relative to the average output per man-hour. Lewis argued that this unusual situation arose due to the transmission of high wages, from the high productivity sectors, to the low productivity sectors by trade unions. He therefore suggested that if regional currencies were to maintain any semblance of stability, an incomes policy would have to be implemented in each state. Such a strategy would ensure that regional exports remain competitive, and avoid balance of payments difficulties common in most developing economies.

Taylor (1974), building on Lewis' (1972) analysis, also addressed the issue of an optimum exchange rate policy for the region. The author noted that, *a priori*, the supply of foreign exchange, over the long-run, is likely to be highly responsive to exchange rate variations given the nature of most regional exports (commodities and light manufactured

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goods). On the other hand, the low internal resource mobility present in most Caribbean nations, and the inflexibility in the aggregate demand structure, implies that the demand for foreign exchange is likely to be relatively inelastic. Combining these two conclusions, the author argued that shifts in the supply, rather than the demand, for foreign exchange is likely to be more destabilising within the region. However, he posited that to achieve exchange rate stability the opposite would have to be the case; the demand curve should have a greater influence on the exchange rate.

Modeste (1994) employed a more empirical approach to the study of real exchange rates. He attempted to identify the main determinants of the real exchange rate in Barbados using cointegration techniques, and annual data covering the period 1974 to 1989. Modeste found that, based on bilateral real exchange rate indices between Barbados and several of its main trading partners, the United States of America (USA), the United Kingdom (UK) and Trinidad and Tobago (T&T), that the nation's competitive position had declined over the period under investigation. Thus, he estimated a simple long-run regression to identify the main reasons for this deterioration, and observed that the nominal exchange rate, relative wages and relative productivity were all important determinants. Modeste did not provide estimates of exchange rate misalignment, but based on the econometric results suggested that such problems could be corrected using an incomes policy, or a nominal exchange rate change.

Harriott and Worrell (1997) provided one of the first studies that attempted to derive equilibrium real exchange rate estimates for Caribbean and Latin American countries. They utilised a panel regression model of the real exchange rate, using the terms of trade, government consumption of non-tradables (a proxy for capital controls over capital inflows)

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and three macro-economic policy variables: the excess supply of domestic credit, the fiscal deficit as a ratio of lagged money and the rate of growth of credit. The coefficient estimates were obtained using the fixed effects estimator, and annual data over the period 1967 to 1995 for ten Caribbean countries. Harriott and Worrell's results indicated that Barbados' real exchange rate is not significantly different from its equilibrium value. However, no similar conclusions could be derived for T&T and Jamaica. One of the main shortcomings of the paper was that cointegration techniques were not employed to obtain the long-run equilibrium values. As a result, the equilibrium exchange rate estimates provided could have been subject to a large degree of error.

More recently, Francis (1998) examined the issue of whether the Jamaican dollar was overvalued in 1995. The paper utilised two approaches to address this question. The first method estimated a net exports function in order to assess whether a depreciation would improve the current account balance. The results supported the hypothesis that a devaluation could improve the country's external position. The second approach calculated an implicit exchange rate as the ratio of GDP (measured in nominal Jamaican dollars), to the purchasing power parity GNP in US dollars. This technique yielded the surprising conclusion that the exchange rate is in fact undervalued. One of the main shortcomings of the second approach was that it calculated an equilibrium exchange rate, which did not bear any direct relationship to whether the nation is in external or internal balance, but instead produced an estimate of the relative prices between two countries. On the other hand, the first approach does not allow one to conclusively assess whether the exchange rate is over or under valued because one would still need optimal values of the explanatory variables in the export function.

3. Methodology and Data

3.1 The Behavioural Equilibrium Exchange Rate Approach (BEER)

This paper uses the behavioural equilibrium exchange rate approach of Clark and MacDonald (1998) to provide an econometric analysis of the REER in the Caribbean. The approach begins by estimating a reduced form equation that explains the stochastic process of the REER over the period. The reduced form equation can be specified as:

$$q_t = \beta_1' Z_{1t} + \beta_2' Z_{2t} + \tau' T_t + \varepsilon_t \tag{1}$$

where q is the REER, β_1', β_2' and τ' are vectors of reduced form coefficients, Z_1 is a vector of fundamental variables that influence the real exchange rate in the long run, Z_2 is a vector of fundamental variables that only impact on the real exchange rate in the medium term, T is a vector of variables which only have a transitory impact on the REER, and ε is a disturbance term with normal properties.

Within the BEER framework, the extent to which the REER is misaligned (m) can be expressed by:

$$m_t = \tau' T_t + \varepsilon_t + \left[\beta_1'(Z_{1t} - \overline{Z}_{1t}) + \beta_2'(Z_{2t} - \overline{Z}_{2t}) \right] \tag{2}$$

where a bar above the variable indicates its equilibrium value. Equation (2) shows that exchange rate misalignment may be due to transitory factors, random disturbances, and how far the fundamental variables are away from their equilibrium values. The estimate of the equilibrium exchange rate misalignment is obtained as the residual between the fitted REER, from the long-run cointegrating model (referred to as BEER), and the actual REER.

The fundamental variables employed, in this study, are similar to those utilised by Clarke and MacDonald (1988) and include productivity relative to the country's main trading partners, openness, the fiscal balance and net foreign assets.[2] Assuming prices for traded and non-traded goods are linked to wages, which are in turn linked to productivity, and wages are equalised across the two sectors, this would imply that the price of locally produced goods should increase at a slower rate for a nation with high productivity. As a result, the nation's REER should appreciate, even if purchasing power parity is assumed to hold. Thus, the REER is likely to be positively associated with the productivity differentials between the country under investigation and its trading partners.

A proxy to measure the level of trade restrictions in place in the nation, openness, is included in the econometric specification. Trade restrictions raise the prices of non-tradable goods as consumers attempt to substitute away from the now higher priced imported good, therefore the relationship between the REER and the index of openness should be positive. However, in some small open economies (SOE) the significance of this substitution effect may be diminished if there does not exist a large number of import substituting industries.

Government's fiscal position is also included in the econometric model, and is proxied by government consumption as a ratio to GDP. In the Mundell-Fleming model, an improvement in government's fiscal position increases national savings, and therefore lowers domestic interest rates and by extension the exchange rate. In contrast, the portfolio balance approach of Branson (1977) and Dornbusch and Fisher (1980), argues that a fiscal improvement should lead to an increase in the net foreign assets (NFA) of the nation, and should cause the real exchange rate of the nation to appreciate. As a result, the coefficient of

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[2] The relative real interest rate and an index of commodity export prices were also included in the initial analyses, but proved to be insignificant explanatory factors.

the fiscal variable is ambiguous. The NFA of the banking system is included in the model as a separate explanatory variable, since greater NFA can result in a rise in domestic expenditure, which then leads to an excess demand for non-tradable goods, and by extension an increase in their price. Therefore, the REER and NFA should be negatively related.

3.2   Econometric Approach

This study uses the Johansen (1995) cointegration approach to derive the equilibrium exchange rate for Barbados, Jamaica and Trinidad and Tobago. The framework begins with a vector autoregressive (VAR) representation of the form:

$$y_t = \eta + \sum_{i=1}^{p} \Pi y_{t-i} + \varepsilon_t \qquad (3)$$

where y is a $n \times 1$ vector of variables consisting of the REER, productivity differentials, openness, fiscal balance and NFA which may be I(1) or I(0), η is a $n \times 1$ vector of deterministic variables, Π is a $n \times n$ coefficient matrix and ε is a $n \times 1$ vector of disturbances with normal properties. If there exists a cointegrating relationship among the I(1) variables, Equation (1) may be re-parameterised into a vector error correction mechanism (VECM):

$$\Delta y_t = \eta + \sum_{i=1}^{p-1} \Phi_i \Delta y_{t-i} + \Pi y_{t-1} + \varepsilon_t \qquad (4)$$

where Δ is the first difference operator, and Φ is a $n \times n$ coefficient matrix. The rank of Π determines the number of cointegrating relationships. If the matrix Π is of full rank, n, or zero, there is no cointegration amongst the variables. However, if the rank of Π is less than

n, then there exist $n \times r$ matrices α (adjustment matrix) and β (cointegrating vectors) such that $\Pi = \alpha\beta'$, Equation (4) provides the more appropriate framework. The β vector can be used to derive the long run BEER and therefore allows one to examine how far away from equilibrium is the actual REER.

The Trace statistic (*TR*) is used to test for the existence of cointegration, amongst the non-stationary variables. The test statistic is derived from:

$$TR = T \sum_{i=r+1}^{N} \ln(1 - \hat{\lambda}_i)$$
(5)

and test the hypothesis that there at most r cointegrating vectors. The $\hat{\lambda}_{r+1}, ..., \hat{\lambda}_n$ are the $N - r$ smallest squared canonical correlations between the y_{t-k} and Δy_t series.

3.3   Data Sources and Definitions

The study uses quarterly data over the period 1970Q1 to 2001Q4. The REER is a consumer price index (CPI) based REER of a country's main trading partners relative to that of the domestic currency. The variable is defined as follows:

$$q = \sum_{i=1}^{N} w_i ln(e_i * p_i / p)$$
(6)

where w_i is the trade weight for partner country i, e is the bilateral nominal exchange rate, p_i is a measure of prices in trading partner country i, and p is the domestic price index. Equation (6) therefore implies that a rise in the REER represents an improvement in external price competitiveness. The data on the consumer price indices and nominal exchange rates are

obtained from the International Monetary Fund's (IMF) International Financial Statistics (IFS) database. The trade weights for Barbados is obtained from the Central Bank of Barbados' Annual Statistical Digest, for Jamaica the data is derived from the Bank of Jamaica Statistical Digest, while that for Trinidad and Tobago is taken from the Central Bank of Trinidad and Tobago's Monthly Statistical Digest.

Productivity is proxied by real GDP per capita relative to trading partners. The GDP and population data for all three countries is recovered from the IFS database. Unfortunately, only annual real GDP data is available over the sample period. Therefore, the temporal disaggregation procedure proposed by Boot and Feibes (1967) is employed to obtain mathematical consistent, quarterly GDP values. The productivity variable is a relative one; domestic GDP per capita is expressed as a ratio of the weighted average of the GDP values for the nation's main trading partners. Openness is calculated as the ratio of exports and imports to nominal GDP at market prices, and is obtained from the IFS database. The fiscal balance is proxied by the ratio of government consumption to nominal GDP at market prices, while NFA is the end of period net foreign assets of the banking system as a ratio of GDP. These variables are all obtained from the IFS database.

The calculated REER for Barbados, Jamaica and Trinidad and Tobago are plotted in Figure 1. The chart indicates that both Barbados and Jamaica have made sizable competitive gains over the sample period. In Barbados, the REER in 2001 was estimated at 0.715, compared to only 0.224 at the beginning of the sample period. The improvement in Barbados' competitive position, during the latter half of the review period[3], came mainly due

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[3] Barbados' main means of adjustment is through labour cost given that its nominal exchange rate is fixed at BDS$2:US$1.

to a slowdown in wage growth.[4] For example, between 1973 and 1987 the average annual rate of wage growth was estimated at 17.8%, or almost twice the rate of expansion obtained between 1988-2000. As a result of these excesses, the average rate of inflation during this period was uncharacteristically high for Barbados, estimated at 11.5% compared to only 3.2% between 1988-2001. Although significant gains have been made in the 1990s in terms of competitiveness in Barbados, since 1999 the rate of increase in the REER has been flat. This outturn seems again to have been due to large increases in wages between 2000 and 2001. It is estimated that in 2000 and 2001 nominal wages grew by 3.8% and 3.3%, respectively, while the average rate of inflation over this period was only 1.3%.

Jamaica has also recorded a significant expansion in external competitiveness during the period under investigation. In Jamaica, the REER began the review period at 2.898, and by the end of 2001 it estimated at 3.457. Unlike Barbados, most of this improvement in external competitiveness was obtained through steep nominal exchange rate devaluations and, to a lesser extent, a slow down in real wage growth during the early 1990s. The Jamaican dollar began the review period at JAM$0.83/US$1 and by the 2001 it had depreciated to JAM$47/US$1. The growth in the REER for Jamaica has not been consistent. For example, for most of the 1990s Jamaica's REER stagnated and even declined. Like Barbados, this scenario seems to have been due to unrealistic wage increases during the period. It is estimated that between 1993 and 1999, real wages rose on average by 10.8% per year. Since 1999 the REER has appreciated, indicating an improvement in external competitiveness. However, this adjustment again came through a nominal exchange rate depreciation rather

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[4] A reduction in real wages causes the price of non-traded goods to expand at a slower rate than those for traded goods and thus an improvement in the REER.

than a slowdown in real wage growth. Jamaica's nominal exchange rate, which for most of the 1990s hovered around the JAM$35/US$1 mark, depreciated to JAM$46/US$1 by 2001.

Unlike the other countries, Trinidad has recorded a consistent decline in its REER over the period.[5] Trinidad and Tobago, which began the period with a REER of 2.372 in 1970, ended the review period with a REER of only 1.256. This outcome was achieved inspite of a nominal exchange rate devaluation and real wage restraint. Trinidad and Tobago's nominal exchange rate which began the period at TT$2/US$1 ended the review period at TT$6.20/US$1. One of the key reasons for this outturn is that Trinidad and Tobago's relatively high rate of inflation, which averaged 9.7% per year over the sample period, compared to only 5.3% in the USA, which represents 67% of total trade in Trinidad and Tobago.

4.   Estimation Results

The augmented Dickey-Fuller test statistics for the non-stationarity of the fundamental variables and the REER are given in Table 1. The approach tests the null of non-stationarity against the alternative of stationarity. The results show that all the variables are integrated of order one at classical levels of testing.

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[5] This statistic may be surprising but accords with the values obtained from the IMF's International Financial Statistics database. It is also probably reflective of the significant competitive advantage Trinidad and Tobago had relative to other Caribbean at the beginning of the sample period, so as to record a decline in external competitiveness but yet still remain one the largest suppliers of goods in the region.

4.1   Barbados

In order to derive the BEER for Barbados, a cointegrating long-run relationship between the REER and the fundamental variables must be established. The specification used in this study constrains the constant to lie in the long-run relationship, and the lag length is set to two quarters based on the Schwarz criterion. The tests for cointegration among the variables presented earlier in Section 3, is provided in Table 2. This statistic indicates that there exists at most one cointegrating vector.

The cointegrating vector is therefore normalised on the REER, which produces the long-run equation with standard errors given in Table 3. All the coefficients have their correct *a priori* signs, and are of plausible magnitudes. The alpha, or adjustment, matrix associated with this equation is given in Table 4. The alpha is negative and statistical significant in the case of Barbados, and suggests that the REER converges from disequilibrium to equilibrium by approximately 3% per quarter or 12% per year. Thus, the adjustment to a shock to the REER will be offset only after eight years. This relatively slow speed of adjustment in Barbados is primarily reflective of the fixed nominal exchange rate system, and the difficulty of adjusting real wages on account of the bargaining power of local trade unions.

The estimated BEER from the long-run cointegrating relationship along with the actual REER in the period 1974 to 2001 is shown in Figure 2. One of the main features of the diagram is that the fundamentals, reflected by the BEER, can account for most of the fluctuations in the REER. The diagram shows that for the period 1978-1986 the real exchange rate was misaligned, with the actual REER significantly exceeding the BEER. The

explanation for the level of undervaluation achieved during this period occurred on account of a decline in NFA and an expansion in productivity relative to the country's main trading partners. A similar situation is also reported for the 1990-1993 period. However, the subsequent structural adjustment programme, which included an 8% pay-cut for public sector employees, served to restore equilibrium by causing an expansion in the NFA of the banking system and relative productivity. As a result, for much of the 1990s, Barbados' REER was undervalued which was reflected by average current account surpluses of 2% of GDP. However, by the end of the sample period, the actual and equilibrium values converged as a result of a decline in relative productivity.

The BEER approach calculates the equilibrium REER based on a behavioural equation. However, some of the explanatory variables may not have been at their equilibrium values. One can therefore use a smoothing technique, for example the Hodrick-Prescott filter[6], to identify the degree of total exchange rate misalignment and these estimates of the so-called permanent equilibrium exchange rate (PEER) are also provided in Figure 2. The chart shows a similar pattern to the obtained from the analysis of the BEER, with a period of undervaluation in the eighties and late nineties, and a return to equilibrium by the end of the sample period.

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[6] The Hodrick-Prescott filter is a mechanical smoothing procedure and therefore the values generated need not be reflective of internal or external equilibrium. However, they do effectively capture the underlying trend in the variables under consideration.

4.2   *Jamaica*

The VAR model used for the Jamaican exchange rate is quite similar to that for Barbados, namely, two lags and a restricted constant. However, a trend is also included in the cointegrating space. The model is chosen using the general-to-specific approach, based on the Schwartz criterion. The Trace statistic for Jamaica suggests that there exist at most one cointegrating vector.

The authors therefore normalise the cointegrating relationship on the REER, and the estimated model, along with the coefficient standard errors are provided in Table 3. The signs of the variables agree with *a priori* reasoning and, except for the productivity variable, are of similar magnitudes to those obtained in the Barbados case. The adjustment matrix attached to this model is reproduced in Table 4. The negative and significant alpha suggests that the REER in Jamaica converges from disequilibrium to equilibrium by approximately 18% per quarter, or 72% per year. This speed of adjustment is much faster than in the Barbadian case and is reflective of the advantage of a floating over a fixed exchange rate, that is, the nominal rate is allowed to adjust to shocks to the system.

The estimated BEER from the long-run cointegrating model over the period 1970 to 2001 is provided in Figure 3. Similar to Barbados, the fundamentals explain most of the variation in the REER for Jamaica. The diagram also shows that for the period 1983 to 1984 the REER was significantly overvalued. However, this misalignment was corrected by a sharp contraction in the nominal exchange rate from JAM$0.91/US$1 to JAM$1.78/US$1 by 1983. Another period of overvaluation was also observed during 1986 to 1992, which were all corrected by nominal exchange rate depreciations. As at 2001, the REER was therefore

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only 2% above its equilibrium level. Using the Hodrick-Prescot filter gives similar conclusions to those presented earlier.

4.3 Trinidad

The VAR model for Trinidad and Tobago is somewhat different from that estimated for Barbados and Jamaica. The specification does not include a trend or a constant, however, dummy variables accounting for recessionary periods in the early eighties and early nineties are included as unrestricted variables. Again, the lag length is set to two quarters and the Trace statistic indicates that at most, there exists one cointegrating vector.

Normalising the cointegrating vector on the REER produces the long-run equation in Table 3. It shows that all the coefficients, except the openness variable, have their correct *a priori* signs and indicates that as the economy opens to more trade it may suffer a reduction in its external competitiveness. The adjustment coefficient is negative and significant at the 5% level. However, the magnitude of alpha suggests that the adjustment from disequilibrium to equilibrium is only corrected by 1% each quarter or by 4% in a year. As Worrell (2003) notes, although Trinidad and Tobago effectively maintains a floating rate regime, it also undertakes large exchange rate interventions to prevent significant fluctuations. As a result of this policy stance, the adjustment from equilibrium to disequilibrium, as reflected by the small alpha coefficient, is quite sticky and more similar to that for Barbados rather than Jamaica.

Figure 4 plots the actual REER and the BEER and PEER for the period 1970 to 2001. The figure shows that contrary to the previous two countries, Trinidad and Tobago's REER is

more likely to be over-valued rather than under-valued. Two periods justify a closer analysis. First, over the period 1971 to 1976 the REER was significantly misaligned. This disequilibrium was corrected by pegging the nominal currency at a level below its value in the previous quarter, an effective nominal exchange rate depreciation. Again in the 1992 to 1993 period the REER was significantly misaligned, and as a result, national policy makers took the decision to float the currency, which immediately resulted in a depreciation of the currency from TT$4.25/US$1 to TT$5.76/$US1 and bought the actual REER closer to its equilibrium value. However, due to significant exchange rate intervention in the latter half of the 1990s, the REER was somewhat misaligned, but by the 2001 it had converged to its equilibrium value, and was therefore only 6% below its equilibrium value.

5.   Conclusions

Although the idea of an equilibrium exchange rate for the region has been discussed in numerous studies since 1972, little empirical research exists which employs rigorous econometric techniques to identify the equilibrium REER for the Caribbean. This study uses the BEER approach to derive the equilibrium exchange rate for Barbados, Jamaica, and Trinidad and Tobago over the period 1970 to 2001. The BEER approach calculates the degree of REER misalignment as the difference between the actual REER, and that based on the current values of the fundamental variables. The results from undertaking this analysis suggests that at the end of 2001, the REER for Barbados and Jamaica were slightly above their equilibrium values, while that for Trinidad and Tobago was below its equilibrium value.

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In Barbados, given the fixity of the nominal exchange rate, real exchange rate misalignment is most effectively controlled using real wage changes. This leads to the conclusion that general wage agreements should not only take into account productivity changes, but also the degree of exchange rate misalignment when negotiating salary increases. This policy prescription is, however, limited by the bargaining power, which most local unions have over the marker. In contrast, REER misalignment in Jamaica is effectively corrected using nominal exchange rate depreciations or appreciations. Unlike the previous two territories, Trinidad and Tobago's REER seems to be more prone to overvaluation rather than undervaluation. This unusual situation seems to reflect the intervention undertaken on the part of the monetary authorities in order to maintain a stable exchange rate. Another interesting point that is brought out in the study is that the countries are generally improving in terms of competitiveness but at significantly different speeds. For example, Barbados and Jamaica both recorded expansions in the REER, indicating an improvement in competitiveness, while Trinidad and Tobago registered a decline.

One policy recommendation emanating from these findings is that the REER in each territory should be kept as close as possible to its equilibrium level. In Barbados, this would be achieved through wage adjustments and productivity changes. This policy prescription would avoid the problem of some territories fixing their exchange rates at arbitrary values, which are not consistent with either internal or external equilibrium, and therefore could result in balance of payments difficulties (see Barbados circa 1991) and/or significant nominal exchange rate depreciations. In order to make this policy recommendation consistent with convergence criteria, one possibility is to keep the exchange rate stability criterion as it is but

define stability to be within a band measured around the country's BEER and such that each

year the BEERs should converge by a predetermined rate.

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Table 1: Stationarity Tests

Country	lreer	lrgdppc	openness	fiscal	nfa
Levels					
Barbados	-2.480	-1.991	-2.277	-2.616	-2.180
Jamaica	-2.879	-2.618	-1.928	-2.652	-2.758
Trinidad and Tobago	-2.848	-1.846	0.607	-0.170	-2.723
First Difference					
Barbados	-2.932**	-5.116**	-4.347**	-6.866**	-6.118**
Jamaica	-7.328**	-3.282**	-5.835**	-2.989**	-5.401**
Trinidad and Tobago	-7.430**	-3.219**	-4.391**	-4.846**	-4.661**

Note: **, * indicates significance at the 1 and 5 percent significance levels, respectively. The ADF statistics were chosen based on the Schwartz criterion.

Table 2: Significance of Cointegrating Vector Trace Statistics

	Barbados	Jamaica	Trinidad and Tobago
$H_0 : r$	62.420**	106.780**	36.678**
1	30.815	60.517	12.029
2	11.837	38.335	2.274
3	4.476	19.560	0.719
4	n.a.	7.054	n.a.

Note: (a) ** indicates significance at the 1 percent significance level.

(b) n.a. indicates not applicable.

Table 3: Long run Cointegrating Equation (Normalised on the REER)

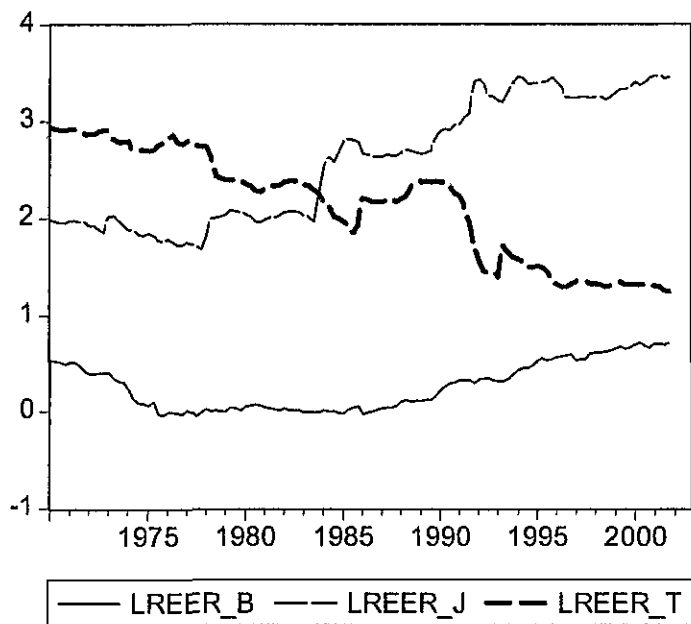|	Barbados	Jamaica	Trinidad and Tobago
lrgdppc	2.737	0.270	1.281
	(0.733)	(0.343)	(0.201)
open	1.962	1.188	-9.486
	(0.789)	(0.277)	(2.345)
fiscal	-	-4.538	-
		(0.937)	
nfa	-0.396	-0.105	-0.269
	(0.085)	(0.023)	(0.158)
trend	-	-0.014	-
		(0.001)	
c	21.278	0.721	-

Note: standard errors are given in parentheses.
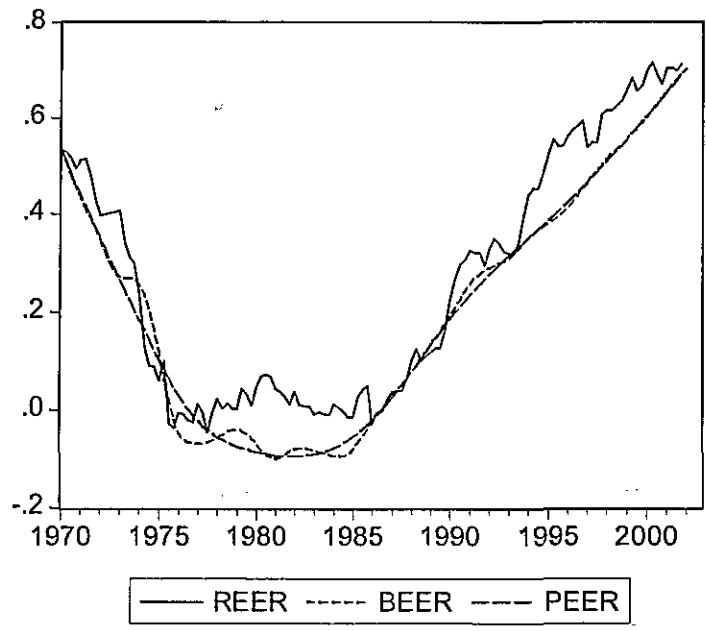
Table 4: Alpha Adjustment Matrix

	Barbados	Jamaica	Trinidad and Tobago
$\Delta\, lreer$	-0.030	-0.178	-0.009
	(0.006)	(0.042)	(0.005)
$\Delta\, lrgdppc$	0.003	-0.003	0.004
	(0.002)	(0.008)	(0.001)
$\Delta\, open$	-0.000	0.007	-0.002
	(0.003)	(0.011)	(0.001)
$\Delta\, fiscal$	-	0.004	-
		(0.001)	
$\Delta\, nfa$	-0.037	-0.086	-0.032
	(0.023)	(0.124)	(0.012)

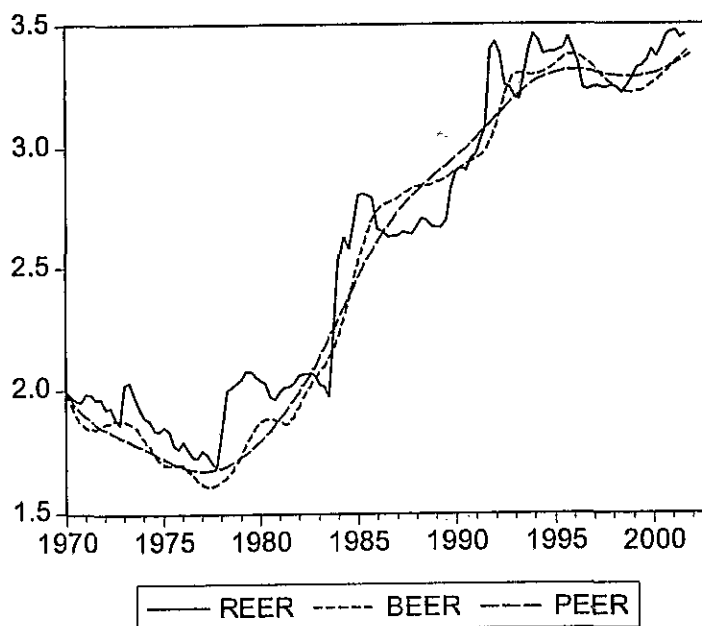*Note:* standard errors are given in parentheses.

Figure 1: REER in Barbados, Jamaica and Trinidad

Figure 2: BEER for Barbados Compared with the REER

Figure 3: BEER for Jamaica Compared with the REER

A line chart titled with y-axis ranging from 1.5 to 3.5 and x-axis from 1970 to 2000, with legend: REER ----- BEER ---- PEER

Figure 4: BEER for Trinidad and Tobago Compared with the REER

REER ----- BEER ---- PEER