

EXCHANGE RATE CONVERGENCE IN CARICOM

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ABSTRACT

The paper investigates the issue of exchange rate convergence in CARICOM during the period 1967 to 1996 as part of the general discussion on CARICOM's single currency initiative. It begins with a review of the optimum currency area literature which is the theoretical genesis of the exchange rate convergence issue, followed by a review of the empirical literature on economic convergence and of CARICOM's attempts at monetary union. Using an empirical test of convergence developed by Hall, Robertson and Wickens (1992), the study concludes that there is little evidence of exchange rate convergence in CARICOM, and that CARICOM's approach to the single currency needs to be reviewed.

INTRODUCTION

In 1992, the CARICOM Heads of Government decided that the region should move towards monetary integration.^{1/} They argued that monetary integration would provide much needed exchange rate and price stability, reduced transactions costs in regional trade and economies in the use of foreign reserves. The new regime would thereby stimulate intra-regional trade, capital flows and investment, increase growth and employment and improve balance of payments performance. Monetary integration, they argued, would enhance economic efficiency and strengthen the capacity of the region to compete internationally.

However, the attainment of these objectives depends critically on effective management of the implementation process, which must be credible and non-reversible. At the very heart of the management process is the issue of economic convergence. Without economic convergence, policy coordination, which is the corner stone of monetary integration, becomes extremely difficult. Lack of convergence would threaten stability of the union.

The purpose of the study is to investigate one facet of the convergence issue, i.e., exchange rate convergence. Given the openness of Caribbean economies, their vulnerability to exchange rate fluctuations and the variety of exchange rate regimes in the region, the exchange rate issue is arguably the most critical and the most difficult

facing the region in the approach to monetary integration.

The paper is divided into five sections. A review of the literature is presented in the first section. In the second section, the CARICOM approach to monetary integration is discussed. The third section discusses the empirical tests of convergence. The model is presented in the fourth section and estimation and results in the fifth section of the paper.

A. LITERATURE REVIEW

The theoretical genesis of the discussion on monetary integration is the optimum currency area literature to which a seminal contribution was that of Mundell (1961). Mundell argued that factor mobility, and particularly labour mobility within a region, is critical to success in the establishment of a currency area. Factor mobility would result in reduced dependence on exchange rate variations for external balance, thus making the area a good candidate for a fixed exchange rate. An important contribution by Mundell was his conclusion that the optimum currency area may not be the nation state but the region.

Mundell's contribution was followed by several others which focussed similarly on a specific attribute for determining the desirability of establishing a currency area. Notable contributions among these were McKinnon (1963) who emphasised the openness and size of the economy as important determining features and Kenen (1969) who presented the degree of commodity diversification as the most important factor. Haberler (1970) and Fleming (1971) argued for the similarity of inflation rates as the decisive factor. Other criteria presented in the literature included the degree of goods and market integration (Mundell - 1961); fiscal integration (Kenen - 1969); the desire for political union (Cohen 1993); the degree of financial integration (Ingram - 1969); and the degree of policy integration (Haberler - 1970).

Increasingly, however, it was recognised that the desirability or non-desirability of a currency union depended on the existence of no single factor but rather the coexistence of several factors impacting on the benefits and costs of the union. Efforts therefore subsequently concentrated on the definition of those benefits and costs. Often mentioned costs include the loss of the exchange rate as a policy tool; the loss of monetary policy independence; increased inflation and unemployment; the loss of fiscal independence, given the need to maintain external regional payments equilibrium, and the possible deterioration of the national economy as a result of the acceleration of polarised growth and development in the region.

Benefits mentioned include the increased mobility of both labour and capital; an increase in the liquidity value of money; the reduction of exchange rate speculation within the region; the reduced foreign reserves requirement, given the fact that intra-regional trade no longer would require foreign exchange. Advocates of the cost-benefit approach include Ishiyama (1975) and Tavlas (1993). However, significant difficulties in quantifying the benefits and costs of monetary integration were recognised. Despite this

shortcoming, proponents of the cost-benefit approach argued that an explicit evaluation of costs and benefits is superior to the single characteristic approach that dominated the earlier literature.

More recent attempts to develop the literature have incorporated new considerations such as the size and correlation of underlying disturbances, the cost of labour mobility, the time consistency of policy and the impact of expectations on exchange rates. In addition, attempts have been made to incorporate the model into an empirical framework, analysing the impact of some of the characteristics which have been detailed in the literature. Examples of these include the work by Bayoumi (1994) and of Bayoumi and Prasad (1996). Bayoumi and Prasad (1996) reviewed the level of industrial diversification, the sources of shocks and the response of labour mobility in an empirical framework in the USA and eight countries of the European Union. They concluded that labour is less mobile in the EU than in the US and that, as a result, significant wage differentials in the EU are likely to persist for some time after the formation of the European Monetary Union.

In the Caribbean, endorsement of monetary integration has been very strong (Blackman - 1988); Bennett (1985,1990); Worrell (1987,1991); Farrell and Worrell (1994)). There has been, however, a diversity of views with respect to the approach to be used. For example, Bennett (1985,1990) proposed the introduction of a Caribbean unit of account as part of a system of dual exchange rates so as to insulate the region from the effects of regional devaluations. Worrell (1987,1991) has strongly advocated the establishment of a single currency, based on macroeconomic convergence as defined by specific economic indicators as the best option. He has opposed any form of exchange rate mechanism (ERM) as an alternative because of disparities in the size and performance of regional economies, the insufficiency of foreign reserves and the lack of sanctions for countries pursuing inappropriate policies. Worrell (1991) also proposed the possible introduction of a Caribbean currency alongside national currencies. Blackman (1994) sees a regional ERM as an alternative to the single currency.^{2/} Farrell (1994), taking a somewhat more flexible approach, endorses the linking and eventual locking of regional exchange rates, but also concedes the evolution therefrom to a single currency as a distinct possibility.^{3/}

The overriding distinction in the debate centers around the choice between a regional ERM which Farrell (1994) referred to as a weak monetary union as opposed to a strong monetary union characterised by the establishment of a single currency, a single Central Bank and the centralised management of monetary policy.^{4/} It was the latter view that prevailed in the CARICOM approach to monetary integration.

B. CARICOM'S APPROACH TO MONETARY INTEGRATION

The criteria for entry into the monetary union were presented in the 1992 report of the Central Bank Governors. The 3-12-36-15 criteria required that:

- i. countries maintain foreign reserves equivalent to three months of import cover for a period of 12 months;

- ii. the exchange rate be maintained at a fixed rate to the US dollar for 36 consecutive months without external debt payment arrears; and
- iii. the debt service ratio be maintained within 15% of the export of goods and services.^{5/}

In 1996, it was proposed that the import cover criterion be amended to include three months of import cover or 80% of central bank current liabilities, whichever is greater. Additionally, it was proposed that the fixed parity rule be amended to include bands of 1.5% on either side of parity for floaters. Fixers were required, however, to maintain their parity for a period of 36 months.^{6/} Governors of Caribbean Central Banks gave to the Caribbean Center for Monetary Studies the responsibility of monitoring the foregoing indicators.

The community envisaged the implementation of a monetary union in three stages on the basis of two groupings, A and B. The OECS, The Bahamas and Belize were placed in category A. Since these countries had already met the criteria for entry in 1992, their task was simply the maintenance of macroeconomic stability. Category B countries included all other CARICOM members whose task it was to make the appropriate adjustments to satisfy the entry criteria.

The first phase of the monetary integration process was to have been concluded in 1996 and was to have included the OECS, Belize, The Bahamas, Barbados and Trinidad and Tobago. There was to have been a common currency with the exception of Belize and The Bahamas. The second stage was to have covered the period 1997 to 2000 and was to include the following initiatives:

- i. the formation of a Caribbean Monetary Authority;
- ii. the issuance and circulation of a common currency in the first tier countries excluding The Bahamas;
- iii. use of the new currency in the remaining countries as a unit of account in the settling of regional transactions; and
- iv. continued adjustment by Jamaica and Guyana to meet the criteria for entry into the union.

The third phase, which was to have begun in the year 2000, had the objective of entering all CARICOM countries into membership of the Caribbean Monetary Authority.^{7/} However, with the floating of the Trinidad dollar in 1993, the implementation of Stage I was suspended. In sustained pursuit of the goal of monetary integration, Caribbean Central Bank governors responded by making regional currencies fully convertible with each other. It was subsequently proposed that Barbados, Belize and the OECS form a union by the end of 1997. This also was not achieved. CARICOM therefore must reformulate the monetary integration schedule. More importantly, however, it may have to reformulate its approach to the process of monetary integration.^{8/}

C. EMPIRICAL TESTS OF CONVERGENCE

Given the centrality of the convergence issue in the monetary integration debate, attempts have been made to operationalise the concept empirically. Four notable attempts are those by Honohan (1992); Haldane and Hall (1991); Hall, Robertson and Wickens (1992) and Leon, Samuel and Samuel (1996). Using an error correction mechanism, (Honohan -1992) investigated the convergence of inflation and interest rates in the rand and franc zones in Africa over the period 1973 to 1988, and found empirical evidence to support his convergence theory with respect to the two core countries, i.e., France and South Africa. Leon et al (1996) investigated the convergence of inflation rates in a select group of Caribbean countries (Barbados, St. Lucia, Jamaica, Dominica and Trinidad) during 1970 to 1992. Using the Johansen procedure for testing the existence of cointegration, they concluded that inflation rates in four of the countries (Jamaica excepted) were cointegrated and had converged during the period.

Haldane and Hall (1991) investigated the relationship between the US dollar, the Deutsche Mark and pound sterling between 1976 and 1989. They found that the pound had converged on the Deutsche Mark during the period. They concluded that, as a result of this convergence with the Deutsche Mark, it would be easier for the pound sterling to be a part of the European Monetary System than would have been the case if the pound sterling were convergent with the US dollar.

Hall, Robertson and Wickens (1992) broadened the study to include nine European Union currencies and once again investigated convergence with the Deutsche Mark and the US dollar. They defined economic convergence between two series as the approximation to a constant of the difference between the series. In other words, in the limit as time goes to infinity, the difference between two variables X and Y would equal some constant, \bar{c} . In stochastic terms this is expressed as $E\{\lim_{t \rightarrow \infty} (a(t))\} = \bar{c}$. They then went on to describe two types of convergence: (i) strong system convergence and (ii) weak system convergence. In the case of strong system convergence, all pairs of variables in the system have converged. In the case of weak system convergence, some pairs have converged while others have not.

To operationalise their concept, Hall et al.(1992) used a simple three variable model, including the Deutsche Mark, the pound sterling and the US dollar. In an attempt to determine whether the Deutsche Mark and the pound sterling had converged during 1976 to 1989, they used the model presented below:

$$(X_{DM} - X_{UK}) (t) = a(t) + b(t) (X_{DM} - X_{US}) (t) + e(t) \quad (1)$$

where X_{DM} , X_{UK} and X_{US} are the logs of the exchange rates of the Deutsche Mark, the pound sterling and the US dollar respectively. The parameters in the model are time-varying. This emphasises their assertion that convergence is a process rather than a state. The critical parameter in the model is $b(t)$. The expectation is that this parameter would tend to zero in the limit if the Deutsche Mark and the pound sterling have converged. Alternatively, if the Pound Sterling and the US dollar have converged, this parameter would tend towards one. However, the convergence of $b(t)$ to zero is considered a necessary but not sufficient condition for convergence between the Deutsche Mark and the pound sterling. They insisted that for convergence, both $a(t)$

must tend to a constant and $b(t)$ must tend towards zero. They also added that cointegration among the variables under consideration (in this case the Deutsche Mark and the pound sterling) is a necessary but not sufficient condition for convergence. Consequently, cointegration among the variables must be investigated prior to model estimation. Hall et al.(1992) intimated that this model could be used to investigate the convergence of any two variables.

D. THE MODEL

Following the Hall et al.(1992) model, the study begins by investigating the convergence of nominal exchange rates in the CARICOM region during the period 1967 to 1996. The model used is presented below:

$$(X_{TT} - X_{CARICOM}) = a(t) + b(t) (X_{TT} - X_{US}) + e_t \quad (2)$$

where X_{TT} , X_{US} and $X_{CARICOM}$ represent the logs of the nominal exchange rates of the Trinidad dollar, the US dollar and individual CARICOM (Barbados, Guyana, Jamaica, Eastern Caribbean, The Bahamas, Belize, Suriname) currencies vis-a-vis the SDR.^{9/}

E. ESTIMATION AND EMPIRICAL RESULTS

The variables of the model were first tested for stationarity. The results are presented in Table 1 below. With the exception of the Guyanese exchange rate, the logs of all other exchange rates are I (1). This result in itself suggests a problem for the region with respect to the convergence of exchange rates in the move towards monetary integration, and supports the decision that at least the Guyanese currency be not part of the initial phase of the union. The fact that the remaining currencies are all I(1) suggests that they may be more readily candidates for monetary union. Additionally, cointegration analysis using the Johansen model suggests the existence of at least one cointegrating vector among the I(1) CARICOM currencies. The cointegration analysis was done using RATS. The results are presented in Table 2.

To obtain estimates of $a(t)$ and $b(t)$ in equation (2), the Kalman filter was used.^{10/} The Kalman filter is a recursive algorithm used for the estimation of time-varying parameters. In this case, the specific model estimated was the following:

$$Y_t = a(t) + b(t) X_t + e_t \quad (3a)$$

$$a(t) = a(t)_{-1} + v_{1t} \quad (3b)$$

$$b(t) = b(t)_{-1} + v_{2t} \quad (3c)$$

where $Y_t = \log X_{TT} - \log X_{CARICOM}$; $X_t = \log X_{TT} - \log X_{US}$ in equation (3a) and e_t , v_{1t} and v_{2t} are assumed normally distributed error terms with zero mean and constant variance. The error terms are also assumed both serially uncorrelated and independent of each other.

Table 1: Stationarity Tests		
Logs of the Exchange	Computed ADF Test	Computed Perron Statistic

Rates	Statistic	11/
US Dollar*	-3.56	-3.42
Trinidad Dollar*	-2.70	-1.83
Barbados Dollar*	-4.03	-3.25
Bahamas Dollar*	-3.56	-3.43
Belize Dollar*	-3.24	-2.62
Guyana Dollar**	-5.23	-3.32
Jamaica Dollar*	-4.55	-0.89
Eastern Caribbean Dollar*	-2.90	-2.57
Surinam Guilder*	-3.59	-4.24

The ADF statistic (1% level of significance) is -2.65 *Variables are I(1) ** Variable is I(2)

Table 2: Test of the Number of Cointegrating Vectors				
M Max(Computed)	Trace(Computed)	Ho: r	M Max*	Trace*
52.31	213.09	0	36.36	82.49
27.49	60.79	1	30.04	59.46
18.72	33.29	2	23.80	39.89
7.86	14.58	3	17.89	24.31
5.37	6.71	4	11.44	12.53
1.34	1.34	5	3.84	3.84

*5% critical values

Unlike the case of Hall, Robertson and Wickens (1992), the estimates of $a(t)$ with the exception of the Bahamian currency, were all non-stationary. Thus, one of the conditions for convergence with the Trinidad dollar was not satisfied. Figures 1, 2 and 3 below present graphically the results with respect to $b(t)$. Estimates of the coefficients $a(t)$ and $b(t)$ are presented in Table 1 of the Appendix. Figure 1 presents the results for the region as a whole while Figures 2 and 3 present the results for sub-groups within the region, specifically the floaters (Guyana, Jamaica and Suriname) and fixers (Barbados, Belize, The Bahamas, Eastern Caribbean).^{12/}

The empirical results are very instructive. First of all, they show a clear difference between the fixers and the floaters in the region.^{13/} Over the period, the relationship between the exchange rates of the fixers and the US dollar seems to have strengthened while the floaters have gone their individual ways. Particularly noticeable in Figure 3 is the intensification of the relationship of the fixers with the US dollar especially since 1985 (Figure 2) as a result of the significant devaluation of the TT dollar. The strengthening of the relationship with the US dollar continued thereafter with the devaluation of the TT dollar by 15.2% in 1988 and subsequent floating in 1993.^{14/} Given the desire of the regional authorities to include the Trinidad dollar in the first phase of the monetary integration process, the foregoing results seem problematic.

An analysis based on real exchange rates provides somewhat different conclusions with respect to the convergence issue. The analysis uses real exchange rates for The Bahamas, Barbados, Guyana, Jamaica, Trinidad, Suriname, Dominica, St. Lucia and the US in equation (2).^{15/} Tests of stationarity indicate that all of the real exchange rates are I(1) variables with the exception of the real exchange rate of the Guyana dollar

which is an I(2) variable (See Table 3). Additionally, as indicated in Table 4, cointegration tests using the Johansen model indicate at least three cointegration vectors.

In all cases, with the exception of the Surinamese exchange rate, a(t) is non-stationary.

Currencies	Computed ADF Statistic	Computed Perron Statistic_{16/}
US Dollar*	-3.51	-2.96
Trinidad Dollar*	-2.89	-3.42
Barbados Dollar*	-3.85	-2.18
Bahamas Dollar*	-3.54	-3.35
Guyana Dollar**	-4.64	-2.94
Jamaica Dollar*	-4.38	-3.13
Suriname Guilder*	-4.02	-9.81
EC Dollar (Dominica)*	-4.04	-3.23
EC Dollar (St. Lucia)*	-3.35	-3.49

The ADF statistic (1%) is -2.65 * Variables are I(1) ** Variable is I(2)

M Max (Computed)	Trace (Computed)	Ho: r	M Max*	Trace *
96.73	232.4	0	41.51	117.3
58.85	135.68	1	36.36	89.37
33.43	76.83	2	30.04	64.74
29.98	43.40	3	23.80	43.84
9.13	13.42	4	17.89	26.70
4.10	4.28	5	11.44	13.31

* 5% critical values

The estimates of $b(t)$ are presented graphically in Figure 4. The statistical results are presented in Table 2 in the Appendix. While no clear pattern of convergence is evident, Figure 4 suggests three distinct phases in the relationship of CARICOM currencies with the Trinidad and US dollars:

- i. the pre oil-boom period (prior to 1973);
- ii. the oil-boom period (1973 to 1982); and
- iii. the post oil -boom period (1983 onwards).

While in the first period, the estimates of $b(t)$ seem centered around one, indicating a relatively stronger relationship with the US dollar, the second period begins with a sharp general decline in the estimates of $b(t)$ in 1973/74, ushering in a period when the estimates of $b(t)$ are closer to zero, suggesting a temporary strengthening of the relationship with the Trinidad dollar.^{17/} To a large extent, this reflects the weakening of the US dollar with the collapse of the Bretton Woods system in 1973 and the further depreciation of the dollar as a result of the two oil shocks in 1973/74 and 1979/80. At the same time, the Trinidad economy in this period was performing very well and the

currency was relatively stable as compared with the US dollar. Trade between Trinidad and the rest of CARICOM had risen substantially as compared with the subsequent period which saw a considerable decline in trade between Trinidad and the rest of the region. The third period is marked by a weakening of the relationship with the Trinidad dollar and a return to a closer relationship with the US dollar. By 1983, the performance of the Trinidad economy had begun to weaken as oil prices and production fell. Trinidad's foreign reserves began to decline and the Trinidad dollar underwent a substantial devaluation in 1985. As can be seen in Figure 4, the estimates for $b(t)$ began to trend upwards as early as 1983. While the US dollar had also depreciated in real terms in post oil-boom years, the real depreciation of the Trinidad dollar was much more substantial, thus explaining the upward drift of estimates of $b(t)$. In the case of Jamaica and Guyana, high inflation rates also contributed to pushing estimates of $b(t)$ upwards. (See Figure 6.).

The division of the 1967-96 period into three sub-periods is instructive in that it demonstrates the vulnerability of the CARICOM exchange rate regimes to external influences, and further underscores the difficulties of the task of monetary integration. More specifically, hindsight teaches that the hinging of the monetary integration process on a single regional economy, and in this case, on the price of a single commodity (oil), is short-sighted. In the current international economic environment with the dismantling of trade preferences, exchange rate liberalisation, increasing international competition and pressure on major export commodities in a number of Caribbean countries, the instability in the performance of the external sector is likely to make monetary integration much more difficult.

Apart from the very real problems posed by exchange rate variability, there are other practical management issues. CARICOM in its approach to monetary integration has decided to establish a tier system. However, the question arises as to how many groupings there should be and which countries should be members of those groups. The analysis of nominal exchange rates suggests that an appropriate approach would be to treat the floaters and the fixers separately. Figure 2 also suggests that Jamaica and Trinidad may possibly be in one group, given the fact that $b(t)$ is closest to zero in the Jamaican case. This would join together the two largest economies in the region with the fixers (The Bahamas, Barbados, Belize and the OECS) in a separate group. The third group would include Guyana and Suriname.^{18/}

The real exchange rate analysis suggests a somewhat different grouping. It suggests that Suriname and possibly the OECS (as suggested by the results for Dominica) may be grouped (See Figure 5) together with Trinidad. However, given the non-stationarity of the residuals once again in the case of Suriname, too much credence cannot be given to that proposition as regards Suriname. More important, the analysis refutes the simple categorisation of fixers and floaters suggested by the nominal exchange rate analysis. The estimates of $b(t)$ for Guyana, St. Lucia and The Bahamas cluster together in the post 1984 period, and the estimates for Jamaica and Barbados seem more closely aligned in the nineties at least until 1995.^{19/}

The foregoing analysis is interesting in that, depending on whether one uses the nominal or real exchange rate analysis, the groupings can be different, and it does raise the important issue of which approach to the application of the exchange rate criterion should be used. Clearly, in the case of a monetary union, it is real rather than nominal exchange rates that are paramount. According to Hall et al. (1992),

"Economic convergence has two aspects: nominal convergence and real convergence. Although it has not usually been expressed in this way, the discussions about the European Monetary System (EMS) largely concern nominal convergence (exchange rates, inflation, interest rates and monetary policy) while **European Monetary Union (EMU) and the Single Market have more to do with real convergence (real exchange rates, growth, wealth creation, real wage costs, unemployment and productivity)**. Despite the fact that the EMS has attracted most attention, the effects of the EMU and a Single Market are ultimately the more important."^{20/}

The same can be said of the Caribbean Single Market and Monetary Union. According to Worrell (1991):

"The aim of Caribbean integration, in all its guises, is not so much to stimulate regional economic flows between members as to combine economic resources to address the world market more effectively."^{21/}

It is a view that Blackman (1994) heartily endorses.^{22/} When the integration process is perceived in this way, it becomes clear that real rather than nominal exchange rates are of primary importance.^{23/}

The problems of categorisation posed above by the exchange rate criterion issue together with past difficulties with the use of country groups suggest that a better approach to monetary integration may be the abolition of such groups and the use of the entry criteria as the sole determinant of membership as occurred in the European Monetary Union. The proposed approach would avoid prejudging the membership issue. Some may argue that this approach may lead to the exclusion of some of the largest economies of the region in the initial stage. However, the issue of critical mass is itself controversial, given the successful establishment of a monetary union in the OECS, the smallest states in the region. In any case, in the context of a monetary union, stability and credibility may be much more important than size, especially in the initial stages of implementation. Clearly the time has come for an intensive rethink of the implementation process in terms of the criteria, implementation time, overall management and strategy.

The convergence criteria need re-examination. Given the fiscal profligacy that has periodically characterised several regional economies leading to serious balance of payments and exchange rate difficulties, the exclusion of fiscal criteria is puzzling and needs to be reviewed. The omission of domestic debt, although in several regional economies it has grown substantially in recent years, also needs to be reconsidered. Its inclusion may be separate or as part of an overall public debt criterion such as public

debt as a percentage of GDP. Arguably, such a criterion would be superior to the debt service ratio which is currently in use in that it addresses more comprehensively the issue of debt accumulation.

The question of time span of the implementation process also needs to be reviewed. In the EU, monetary integration in the form of an ERM preceded the implementation of a single currency by twenty years. It seems unrealistic to assume that in the Caribbean where exchange rates, especially in recent years, have been much more unstable, this objective will take a mere eight years to achieve.

The entire approach to the management of the process needs review. Currently, the approach focuses on monitoring country performance vis-a-vis the entry criteria. Achievements to date would suggest that regional management of the process needs to be somewhat more rigorous. If a regional economy is trending away from the fulfillment of the agreed criteria for membership of the currency area, is there regional discussion as to why the specific variables are behaving in that way? Are there specific policy commitments on the part of the country to reverse the trend? What possible sanctions are there to induce corrective policy? These are important management issues that go beyond simple performance reports.

Most fundamental, however, is the issue of strategy as it relates specifically to the approach to monetary integration. The critical question is: on what basis should monetary integration be pursued - through an ERM as suggested by Blackman (1994) and Farrell (1994) or on the basis of macroeconomic convergence as in the case of the current CARICOM approach? The difficulties encountered so far by the latter approach suggest the need perhaps to reappraise that approach and to take another look at the ERM. The ERM approach has the advantage of allowing regional policy makers to focus initially on one variable/criterion instead of several as in the current approach. Additionally, the ERM approach allows regional policy makers, at least initially, some policy flexibility with respect to the other criteria. Furthermore, given the fact that several regional economies already have fixed exchange rates and have had these for a very long time, the initiation of an ERM ought to be less problematic. The policy focus can then be on the floaters, the weak link in the chain.

Once exchange rates are locked in, the region can then move on to the next phase towards monetary union. By then, the commitment to such a union would have been reasonably established through membership of the ERM and some economic convergence would most likely have automatically taken place as a result of membership of the ERM as occurred in the EU case. At this point, as the region moves towards a single currency and Central Bank, the issue of policy convergence would come more explicitly into play so as to give increased stability to the union. The ERM approach would allow the process of economic convergence to begin to take place naturally while not making it a focus in regional deliberations. As a result, the next phase when the issue of economic convergence would be more explicitly and broadly addressed, should be much easier.

F. CONCLUSION

The process towards monetary integration in the Caribbean is in difficulty. Given the openness of Caribbean economies, the cause, to some extent, lies in the substantial changes that have taken place in the world economy (increasing international competition, instability in the prices of major exports, diminution of preferences, decline in aid flows, etc.) in the nineties. The difficulties also reflect the failure to adjust in a timely manner in the face of fundamental disequilibria, a result of weak economic management. These difficulties, however, have been further compounded by ineffective management of the monetary integration process. Monetary integration will be difficult, but not impossible, if the process is more effectively managed. This will require much more than economic monitoring of individual country performance.

APPENDIX

Table 1: Results for Full Sample Using Nominal Exchange Rates				
Country/Region	a(t)	b(t)	R²	D.W.
The Bahamas	0.01(0.2)	0.99(2.0)	0.99	2.06
Barbados	-0.69(1.2)	0.99(2.0)	0.99	2.03
Belize	-0.31(2.4)	0.79(8.1)	0.85	2.00
Eastern Caribbean	-0.56(4.6)	0.76(8.4)	0.89	2.09
Guyana	0.02(0.1)	1.02(6.05)	0.60	2.03
Jamaica*	1.15(0.2)	-0.32(0.1)	0.99	1.89
Suriname	-0.47(0.2)	-2.41(1.7)	0.91	2.11

t statistics are presented in brackets

Table 2: Results for Full Sample Using Real Exchange Rates				
Country	a(t)	b(t)	R²	D.W.
The Bahamas	0.21(2.2)	0.87(16.0)	0.99	2.35
Barbados*	-0.22(0.03)	0.68(0.2)	0.99	2.19
Dominica	0.2(1.0)	0.18(1.3)	0.07	2.01
Guyana	-0.06(0.2)	1.10(3.1)	0.28	2.03

Jamaica	-2.08(4.1)	1.12(3.2)	0.32	2.12
St. Lucia* ^{24/}	0.45(0.1)	0.67(0.2)	0.96	2.41
Suriname	0.08(0.08)	0.16(0.24)	0.002	1.59

t statistics are presented in brackets

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^{1/} Although monetary integration may take many forms, it consists essentially either of the establishment of a single currency in a region or the fixing of exchange rates among members backed by currency convertibility. For further discussion, see Hilaire et al, "Options for Monetary Integration in the Caribbean and D. Worrell, *The Harmonisation of Exchange rates in the Commonwealth Caribbean in Caribbean Monetary Integration* (eds.) T. Farrell and D. Worrell (1994).

^{2/} C. Blackman, *A Common Currency for the Caribbean: A Critique*, in *Caribbean Monetary Union* (eds.) T. W. Farrell and D. Worrell, Caribbean Information Systems and Services Ltd., Trinidad, 1994.

^{3/} T. W. Farrell, *Regional Debt Strategy in the Context of Monetary Union*, in *Caribbean Monetary Union* (eds.) T. W. Farrell and D. Worrell, Caribbean Information Systems and Services Ltd., Trinidad, 1994.

^{4/} T.W. Farrell, *Monetary Union: A Guide for the Perplexed*, in *Caribbean Monetary Integration* (eds.) T. W. Farrell and D. Worrell, Caribbean Information Systems and Services Ltd, Trinidad, 1994.

^{5/} Council of CARICOM Central Bank Governors, *Final Report of the Task Force on Currency Convertibility and Economic Convergence*, November 1996, p.4-7.

^{6/} *Ibid.*, p.39.

^{7/} The Caribbean Monetary Authority would issue the Caribbean currency, be responsible for regional monetary policy, the regional foreign reserves pool and exchange rate management, regional coordination of economic policy and banking supervision. For a fuller discussion of the phases, see *Caribbean Monetary Integration* (eds.) T. W. Farrell and D. Worrell (1994), p. 236-41.

^{8/} The EU required that members satisfy four criteria for entry: (i) that the rate of inflation of the prospective member country be within 1.5 percentage points of the average of the lowest three rates in the community; (ii) that the interest rates on long term securities be within 2 percentage points of that within the foregoing three members; (iii) that the exchange rate of the prospective member be kept within the band of the ERM without realignment for two years; and (iv) that the overall fiscal deficit be not greater than 3% of GDP and that the ratio of public debt to GDP be not greater than 60%. The satisfaction of these criteria was to be achieved in three phases over approximately eight years. The purpose of the criteria, as in the CARICOM case, was to enforce economic convergence. By May 1998 when the selection was made of countries for entry into the European Monetary Union, the aforementioned economic indicators had converged in the majority of EU member countries.

^{9/} The SDR, created in 1967 by the IMF, is a currency basket composed of the currencies of the five IMF members with the largest portions of world exports of goods and services. The weight of each currency in the basket reflects both trade performance and the amounts of the currencies held as reserves by IMF members. The basket is reviewed every five years. The exchange rate of national currencies with the SDR is determined by the daily market rates of the basket of currencies translated into US dollar amounts (US dollar:SDR exchange rate) and subsequently converted into the national currency at the exchange rate of the US dollar to the national currency. Since 1981, the SDR has comprised the US dollar; Deutsche mark; Japanese yen; French franc and the Pound sterling. The current weights of these currencies in the SDR basket, which have not changed significantly since 1981 when they replaced the sixteen currencies that previously comprised the basket, are the US dollar(39%); Deutsche mark(21%); Japanese yen(18%) French franc (11%) and Pound sterling (11%). Given the fact that regional currencies generally have been pegged to the pound sterling or the US dollar during the period of investigation, the SDR/regional currency rates which are market determined as indicated above, were used in the estimation process.. The period used was 1967 to 1996. All exchange rates are taken from the IMF Financial Statistics. The US dollar is used since the region is generally considered as belonging to the US dollar currency area. The Trinidad dollar is used as the core CARICOM currency. The Trinidadian economy is one of the two largest economies in the region, and its inclusion in the initial stage of the monetary union is generally seen by the regional authorities as critical for ensuring success. Until 1993, Trinidad and Tobago had a fixed exchange rate which it began to float thereafter.

^{10/} In the literature on the Kalman filter, equation (3a) is referred to as the measurement equation and equations (3b) and (3c) as state or transition equations with the coefficients of the latter referred to as state variables. For a discussion of the Kalman filter, see Haldane and Hall (1991); Cuthbertson, Hall and Taylor (1992); Doran and Ramballi (1997).

^{11/} Given the substantial exchange rate changes during the period, it was necessary to supplement the ADF tests with tests suggested by Perron (1989,1990) for determining

stationarity in the presence of a structural break. In this study, his Additive-Outlier (AO) model was used. The AO model is a two stage model for determining whether a variable is stationary or non-stationary. The null hypothesis is that the variable is non-stationary subject to a single shock/intervention at a given time. The alternative hypothesis is that the variable is stationary subject to a shift in the mean after the intervention. (For a more detailed discussion, see Charemza and Deadman (1997)). The intervention dates used were 1984 (US, Bahamas, Belize, Eastern Caribbean, Guyana and Trinidad); 1983 (Jamaica) and 1994 (Suriname). In the case of the US, 1984 represented the culmination of a period of tight monetary policy in response to high inflation induced by the oil shocks of 1979 and 1983. High interest rates resulted in substantial appreciation of the US dollar. This was in turn reflected in a substantial appreciation of the Bahamas, Barbados, Belize, Eastern Caribbean and Trinidad dollars vis-a-vis the SDR. In the case of Guyana, 1984 also represented the beginning of the process of exchange rate liberalisation culminating in the unification of the official and parallel exchange rates in 1991. For Jamaica, 1983 was the beginning of a similar process with the establishment of the parallel market in January of that year. In Suriname, the major shock to the exchange rate took place in 1994 with the floating of the exchange rate. The critical values for the Perron (1989) test for 1983 and 1984 ($M=0.6$) interventions are -3.62 (lower limit) and -3.55 (upper limit) at the 5% level of significance. The corresponding limits for the 1994 intervention ($M=0.93$) are -3.25 (lower limit) and -3.12 (upper limit). The last column of Table 1 gives the results of the Perron test. Critical values were taken from Table 6 of Charemza and Deadman (1997). To a large extent, the Perron tests corroborate the results of the ADF tests that all the variables are non-stationary. The exception is the Surinamese guilder which, according to the Perron test, is stationary.

^{12/} In the case of Guyana, the model was applied to the first difference of the log of the exchange rate since according to the ADF test, the latter is an $I(2)$ variable. The residuals of equation (3a) for all countries with the exception of Guyana and Suriname are stationary. In the case of Guyana, the non-stationarity of the residuals was due to the substantial changes in the exchange rate in the post-1984 period when the process of exchange rate liberalisation was initiated. The substantial variation of the exchange rate towards the end of the period may also explain the non-stationarity of the residuals in the Surinamese case.

^{13/} With respect to the legend for the graphs, the prefix SV stands for state variable. After this follow the letters designating the various currencies: B (Barbados); BH (Bahamas); BEL (Belize); EC (Eastern Caribbean); G (Guyana); J (Jamaica); SU (Suriname). The suffix SDR2 is common to all currencies, and indicates that the estimation is done using the exchange rate of the currencies vis-a-vis the SDR.

^{14/} The change in $b(t)$ is much more substantial in the case of the Belize and EC dollars than in the case of The Bahamas and Barbados dollars which were already closely aligned with the US dollar after the realignments in 1976.

^{15/} Real exchange rates were estimated as the product of the nominal SDR exchange rates and the ratio of the index of the export unit values of the industrialised countries to the consumer price index of the individual CARICOM countries and of the US. In the case of the US, the index of import unit values replaced the index of export unit values. Because of the lack of data for the entire period, it was necessary to eliminate Belize from this part of the analysis. Additionally, in the case of the OECS countries, a full data set was available only for St. Lucia and Dominica. All data were taken from the IMF Financial Statistics.

^{16/} The Perron tests using the same intervention periods as before, largely support the ADF conclusion that the variables are non-stationary, the exception being, as before, the Surinamese guilder. As in the case of the nominal exchange rates, the residuals for the Suriname equation are non-stationary. The residuals in equation (3a) for all the other currencies are stationary. In the case of the Guyana equation, stationary residuals were obtained using the first order autoregressive rather than the random walk model for the state equation. The autoregression coefficients for both state equations were statistically significant. For the Guyana equation, the first difference of the log of the exchange rate was used.

^{17/} Note, however, that even towards the end of the first period (1971/72), the estimates of $b(t)$ were beginning to trend downwards, reflecting the loss of value of the dollar (devaluation in March 1971 and realignment with major currencies in December, 1971 under the Smithsonian Agreement). For a comprehensive discussion of the difficulties of the US dollar since it became the dominant international currency in the post World War II era, see McKinnon (1993).

^{18/} However, given the non-stationarity of the residuals in the case of both Suriname and Guyana, it would be incorrect to conclude with any degree of certainty what the appropriate groupings for these two countries should be, based on the nominal exchange rate analysis.

^{19/} The analysis using real exchange rates suggests, rather interestingly, that individual OECS countries may be best placed in separate groups.

^{20/} Hall et al. (1992), p.99.

^{21/} Worrell (1991), p.37.

^{22/} Blackman (1994), p.54.

^{23/} Given the various definitions of the real exchange rate as noted by Edwards (1989), the use of real rather than nominal exchange rates can complicate the regional management of the monetary integration process somewhat. However, the EU has been able to finesse the real exchange rate management issue by insisting on the stability not only of nominal exchange rates but of inflation rates as well (See footnote 8).

²⁴ In the abovementioned cases, the R^2 is high but the t statistics are low, evidence of the presence of multicollinearity. Nevertheless, the estimates of the coefficients are used since they are still BLUE. (See Gujarati(1995), p.325-26).
0.45(0.1)0.67(0.2)0.962.41