THE USE OF RELATIVE PURCHASING POWER PARITY THEORY TO INDICATE THE DESIRABILITY FOR A COMMON CURRENCY: THE CASE OF CARICOM

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1. INTRODUCTION

This paper represents work in progress. It is the first draft of an attempt to apply the relative purchasing power parity theory to the analysis of an optimum currency area for the Caribbean. It is based on a "methodology" recently developed and outlined by Vaubel (1978). He studied the European Common Market (E.E.C.), and compared its then projected currency union with two existing national currency unions. Since that paper was accepted, the members of the E.E.C., with a single exception, formalized their currency union. My study makes the assumption that that union was perceived to be an optimum currency area and therefore uses it as a bench mark for evaluating a possible currency union of CARICOM members.

The paper proceeds as follows. Section II is a digression into the relative purchasing power parity theory of exchange rates, and the usefulness of that theory for determining an optimum currency area. (It is certainly a tribute to the benignity of central bankers that such a topic should even be contemplated at this conference). The application made of relative purchasing power parity theory is to determine deviations from relative purchasing power parity, generally called real exchange rate changes between prospective members of a currency union. The smaller are these deviations relative to some optimum, the more desirable is a currency union. Section III carries out the calculations and discusses their results. Section IV draws a strong conclusion.

SECTION II

The relative purchasing power parity between two regions is the product of the exchange rate between their currencies and the ratio of their price indices. Officer (1976) indicates that the concept first seems to have been clearly stated by Cassel in his 1910 Economic Journal article. The major use the latter made of it was to compare its value with the equilibrium value of the exchange rate between two countries determined by their absolute purchasing power parity, i.e. the ratio of their domestic price levels adjusted to account for international trade. He showed that the necessary and sufficient condition, for the equality of the two measures, was the neutrality of money in the two regions.

By assuming that money is neutral in the long run, we can use the relative purchasing power variable to test for the rationality of administered exchange rates between regions. Amacher and Hogson (1974) did that for Yugoslavia's trade with the West. They found the former to be employing an increasing amount of economic criteria in its trading relations with the rest of the world.

However, this paper is about a different use of relative purchasing power parity theory. We owe to Vaubel (1978) the brilliant insight that real exchang-rate changes constitute, "a comprehensive and operational criterion of the comparative costs ... of a monetary unification of a group of countries". At this point it may be worthwhile to review briefly the separate criteria for forming optimum currency areas. It will be quickly seen that CARICOM is an interesting case for the application of these criteria

since from the point of view of some, it is a good candidate for a currency union and from that of others it is not.

Balogh (1950) appears to have been the first to discuss the need for integrating the monetary policies of a group of countries intending to integrate. Commenting on what he perceived to be weaknesses in the early post-war European Payments Union (E.P.U.), he argued:

> It (was) regrettable that little if any attention was paid in the proposals on European 'unification' to the need for: co-ordinating economic and monetary policies on the basis of a semi-automatic institutional arrangement in the E.P.U., to safeguard full employment. In particular, measures should (have been) taken to ease the German and Italian structural unemployment and reverse the general deflationary tendency both in these countries and also in Belgium. Without safeguarding stability effective measures cannot be taken to promote a better integration of Europe or a more far-reaching division of labour.

However, the formal analysis of currency integration did not proceed very far until the issue was raised again in the context of the debate that began in the 1950's about the relative merits of fixed and flexible exchange rates. Mundell's (1961) article was seminal.

It will be recalled that the discussion took off from the assumption that flexible exchange rates were desirable. However, that raised the problem of the minimum size of the regions between which exchange rates should be allowed to vary. Mundell (1961) said that size should be determined by a dominant economic criterion, and the one he chose was factor mobility.[2] However, other economists quickly found reasons to favour other criteria. I shall list the

major ones; but it seems to me that two are of special relevance for CARICOM, I shall give them greater emphasis.

The first of the criteria I feel is of special relevance to CARICOM, is that provided by McKinnon (1963). This is the openness criterion. He claims that the greater is the share of tradable goods in a country's economy, the smaller would be the opportunity for the authorities to exploit exchange-rate illusion, and therefore the lower the cost of maintaining fixed exchange rates. From this it follows that the closer an economy is to being a closed one, for example, the United States and we may also expect India, the closer it should be to an optimum currency union. Individual small open economies should not aim at currency autonomy, but should prefer joining a currency union. The particular form McKinnon (1963) has in mind is the pegging of a small country's currency to one of the central currencies.

Now compare that conclusion with the one that emerges out of the criterion for an optimum currency area presented by Kenen (1969). In this, it is the degree of product differentiation that should determine if an individual economy should maintain an independent currency or join a union. He contends that a well-diversified economy is much more able to bear the cost of a fixed exchange rate than a poorly diversified economy. The argument is based on the theory of large numbers.

Now the countries that contribute to CARICOM are, small open economies trading in a relatively (even absolutely?) narrow range of

group of countries desire to form a currency union, they can estimate the cost in terms of price stability and therefore also real-wage stability that will accrue to each prospective member, by observing the perceived need of each country to vary exchange rate relative to the group.

The following section explores the application of this technique to CARICOM.

SECTION III

Following Vaubel (1978) I define the real exchange rate variations within a group of countries simply as "the variance of their rates of change vis-a-vis a common numeraire". The value of the United States currency, which he used for his study, is clearly the right candidate for my numeraire as well.

This definition may be written as follows:-

$$R = \text{var} \left[d \ln (E_i P_i) / dt \right] \qquad 1$$

Where E_i is the value of the ith country's currency in terms of the United States dollar and P_i is the domestic price level also of the ith country.

Expansion of expression 1 yields -

$$R = \Sigma \left[d \ln (E_i P_i) dt - d \ln (E P)^* / dt \right]^2 / (N-1) \qquad 2$$

where the asterisk denotes the mean value of the variable and the country variances are pooled.

products. If we consider the two preceding criteria for the establishment of a currency union, we learn from the former that these countries should proceed to such a union, but from the latter that each should remain an independent currency area.[3] Ishiyama (1975) has pointed out that this contradiction is due to "difficult assumptions concerning the principal source of ... disequilibrium .... McKinnon is concerned with internal shocks while Kenen is interested in external shocks to export products".

However, this does not get us very far since our economies are prone to both kinds of shocks. In such a case it is desirable to have a more empirical criterion and it seems to me that the one based on the relative purchasing power parity theory has much merit. But before I show that I want to mention briefly some other criteria for determining an optimum currency area.

One that might be attractive to CARICOM was presented by Tower and Willett (1970). This is based on the degree of policy integration. It may be that the common history of the region has given the ministers of finance a fairly similar preference ordering. This could justify the movement to a currency union. The degree of financial integration and the similarity in inflation rates are criteria sometimes mentioned.

Vaubel (1970) shows that all of these criteria are reflected in the real exchange rate variation of member countries of a prospective currency union from the mean real exchange-rate variation of the group. The justification for this claim is straightforward. If a

Expression 2 is clearly not directly observable in economic data. But if the continuous time-rate of change is approximated by discrete changes, and we take note of the rule that $d \ln X = dX/X$ we can write 2 as :

$$R = \Sigma \left(\frac{TT_{i\,t} - TT_{i\,(t-1)} - TT_t^* - TT^*_{(t-1)}}{TT_{i\,(t-1)} \qquad\qquad TT^*_{(t-1)}} \right)^2 /(N-1) \qquad 3$$

where TT is equal to EP and the subscript represent time. Expression 3 is directly observable and can be calculated from data in Tables 1 through 11.

Data are available for eleven of the twelve CARICOM countries. The exception is Belize. For the more developed countries, the analysis is for the period 1962 to 1974. For all countries excluding Belize, Grenada and St. Lucia, it is for the period 1966 to 1974. And for all countries excluding Belize, we cover the period 1966 to 1971. The three sets of results are referred to as A, B, and C respectively.

Vaubel's (1978) test is particularly suitable for the case where individual candidates for a currency union are themselves heterogeneous enough to be considered national currency unions. This is the case with the E.E.C. But it is clearly not the case with members of CARICOM. Therefore, that particular aspect of the test does not concern us. However, a slight re-interpretation of the test makes it very relevant for CARICOM and similar common markets.

In this modification, I propose to compare the real exchange rate variations that took place between CARICOM members, with their

equilibrium values. As we saw in Section II, the equilibrium exchange rates of trading partners vary directly with their inflation rates. Therefore we can write -

$$R^{e} \equiv \Sigma \left(\left(\frac{P_{it} - P_{i(t-1)}}{P_{i(t-1)}} - \frac{P^{*}_{t} - P^{*}_{(t-1)}}{P^{*}_{(t-1)}} \right) \right)^{2} / (N-1) \qquad 4$$

Where R^{e} is the real exchange rate variation that would take place in equilibrium, P is the domestic price level and the asterisk and subscript have the same meaning as in expression 3.

An F statistic is used to test the null hypothesis that there is no significant difference between the variationsin equation 3 and those in equation 4. The policy implication of the result is that if the real exchange rate variations that took place between the members of the union were not significantly greater than their equilibrium values, these countries would appear to constitute an optimum currency area. Vaubel's (1978) test therefore can be used to resolve the apparent conflict of views about the suitability of a currency union for economies like the members of CARICOM.

Tables 12A, 12B, and 12C contain the calculated variances, the estimated value of F and the critical value of F for the analysis of variance test. The null hypothesis is tested at the 0.01 level of significance.

The results are more varied and therefore more interesting than were expected. Comparison of the three tables shows that when the four larger economies are considered together for the longer

France and Luxembourg. This group changes slightly with Denmark replacing Belgium when the shorter period 1971-76 is considered. The variance he obtains for the former group is 0.215, and for the latter is 0.435. These variances appear to be considerably larger than those I have found for CARICOM countries. It is therefore difficult to resist the conclusion that this region constitutes an optimum currency area.

SECTION IV: THE CASE FOR A SINGLE CURRENCY

The results of our analysis of variance exercise not only has confirmed our casual observations, it also has resolved an apparent conflict in economic analysis. We saw earlier that whereas by McKinnon's (1963) criterion CARICOM should be an optimum currency area, when Kenen's (1969) criterion is considered, each member country might optimally be on flexible exchange rates. Vaubel's (1978) inclusive criterion, demonstrates clearly that the region should be a currency union.

However, it may be argued that since the member countries already have their currencies linked to the value of the U.S. dollar, no further harmonisation is necessary. I wish to argue that this is not the case.

Let us review the major benefits and costs usually associated with having a single currency in a region. There are four outstanding benefits. First, there is a saving on reserves. This follows easily from the fact that the members of the union need not hold

period, they are a less suitable currency union than the whole of CARICOM for the shorter period. In fact for the region as a whole we cannot reject the hypothesis of no significant difference between the actual real exchange rate variations that took place between 1966 and 1974, and what would have been the equilibrium real exchange rate variations. For CARICOM as a whole, there would have been no long-run costs attached to becoming a monetary union.

Table 12A shows that the real exchange rate variations of the four larger CARICOM countries, Jamaica, Trinidad, Guyana and Barbados, were significantly greater than their equilibrium values during the period 1962 to 1974. This may be accounted for in part by the large change in value of the Jamaican dollar in terms of the numeraire. Recall that at the start of the period, the Jamaican dollar was worth 2.0 U.S. dollars. By the end of the period, its value had declined to 1.09 U.S. Since some of this change was administered rather than market determined, it may have distorted the underlying pattern of exchange rate adjustments. This, however, is only a tentative suggestion.

A better picture of the suitability of CARICOM for becoming a monetary union, is presented when we compare the variances in Table 12, with three that Vaubel (1978) obtained for the E.E.C. He ranks groups of E.E.C. countries according to the size of their real exchange rate variances. His purpose is to determine the most optimal sub-group of members for initiating a change to a currency union. The group with the minimum variance throughout the period of his analysis 1959-76, consists of the four countries, Germany, Belgium,

each other's currency as reserves any longer. The second major benefit is the greater liquidity value of the region's money. I was reminded of this again when I had to exchange Jamaican money for some that I could use during this conference. The third benefit which may be of greater significance to the region than one is inclined to think, is the reduction in speculative capital movements. The fourth major benefit, which of course I am more hesitant to stress at a conference of central banks' personnel is the saving in management. However, it is difficult to believe that this is not a very scarce good in our region. The full realization of these benefits require more than linked currencies. It requires a single currency.

However, there are a few costs that may be incurred. First, there will be some sacrifice of independent monetary policy in the short-run. But with such open economies as we are discussing, the scope for exchange rate illusion is likely to be very narrow. Analogously there will be some loss of fiscal autonomy. But as Tower and Willet (1970) remind us, an optimum currency area is likely to be one in which there is already a fair degree of fiscal integration. Incidentally, it appears as though Jenkins (1978) regarded these apparent curbs on policy autonomy as a benefit rather than a cost for the prospective E.E.C. monetary union. He was quite likely influenced by his term of office as the finance minister of one of the E.E.C's weak members. It is not improbable that the finance ministers of some CARICOM countries would welcome being able to tell their cabinet colleagues "I loyally support your policy, but

the Governor of the region's bank will not let me have the credit to advance you".

Nonetheless, one cost that should not be ignored when considering any monetary union is that regional imbalances may be aggravated. How serious a problem this might be for a CARICOM monetary union deserves to be investigated.

In passing, we may observe that if in any of the member countries, there is a Phillip's curve relationship, this may be expected to become steeper in a currency union.

This list of benefits and costs must be considered in conjunction with the analysis of variance test just reported. For if Vaubel's (1978) criterion is adequate - as I have maintained throughout - and my modification is accepted, then we already have an estimate of the chance that the benefits will outweigh the costs.

FOOTNOTES

[1] Mignon Guishard and David Brown helped me assemble the data used in this study.

[2] For an extensive survey of these criteria and much other valuable information, see Ishiyama (1975).

[3] It is possible to argue, though no one has done so previously, that what really matters is not product diversification but market diversification. The two will often but not always coincide. The distinction is very important when there is a redistribution of world income rather than a change in its level or rate of growth. The principal "product" of the CARICOM region is tourism. This market is becoming very diversified. This could change the implication to be drawn from Kenen's criterion, and make it consistent with that drawn from McKinnon's.

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TABLE 1

BARBADOS:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962	0.60	97.1	56.32		
1963	0.59	98.9	57.36	1.04	.018
1964	0.58	100.0	58.00	0.64	.011
1965	0.58	102.5	59.45	1.45	.025
1966	0.58	103.3	59.9	0.45	.007
1967	0.57	116.2	66.2	6.3	.100
1968	0.60	122.3	61.2	-5.0	-.075
1969	0.60	131.9	65.6	4.4	.071
1970	0.60	141.8	70.9	5.3	.081
1971	0.61	158.6	80.75	9.85	.139
1972	0.62	185.3	96.35	15.60	0.193
1973	0.61	257.5	131.32	34.97	0.362
1974	0.49	309.8	151.80	20.48	0.155
1975	0.49	332.9	163.12	11.32	0.074

TABLE 2

GUYANA:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962	0.58	97.3	56.43		
1963	0.58	99.7	57.02	1.34	.023
1964	0.58	100.0	58.00	0.18	.003
1965	0.58	102.8	59.6	1.60	.027
1966	0.58	104.9	60.8	1.2	.02
1967	0.57	108.0	61.6	0.8	.013
1968	0.50	111.3	55.7	- 5.9	- .096
1969	0.50	112.7	56.4	0.7	.012
1970	0.50	116.6	58.3	1.9	.034
1971	0.50	118.5	59.3	1.0	.017
1972	0.48	124.4	59.71	0.41	0.006
1973	0.47	136.6	64.20	4.49	0.075
1974	0.45	163.5	73.57	9.37	0.127
1975	0.42	172.0	72.24	- 1.33	- 0.018

TABLE 3

JAMAICA:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962	2.80	96.4	369.9		
1963	2.80	98.0	274.4	4.48	.016
1964	2.80	100.0	280.0	5.60	.020
1965	1.4	102.8	143.9	- 136.10	- .486
1966	1.4	104.8	146.7	2.8	.019
1967	1.38	107.7	148.6	1.9	.013
1968	1.2	114.1	136.9	- 11.7	- .08
1969	1.2	121.3	145.6	8.7	.06
1970	1.2	133.2	159.8	14.2	.098
1971	1.2	142.1	171.8	12.0	.075
1972	1.25	150.3	187.8	16.0	.093
1973	1.09	180.3	196.52	8.7	.046
1974	1.09	227.8	248.30	51.8	0.263
1975	1.09	265.5	289.39	41.0	0.165

TABLE 4

TRINIDAD & TOBAGO:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962	.58	95.5	55.39		
1963	.58	99.2	57.53	2.14	.038
1964	.58	100.0	58.00	0.47	.008
1965	0.58	101.7	59.0	1.00	.017
1966	0.58	106.0	61.5	2.5	.042
1967	0.57	108.2	61.7	0.2	.003
1968	0.50	117.1	58.6	- 3.1	- .050
1969	0.50	120.0	60.0	1.4	.024
1970	0.50	123.0	61.5	1.5	.025
1971	0.54	127.3	69.1	7.6	.123
1972	0.52	139.2	72.3	3.2	.046
1973	0.51	159.8	81.4	9.1	.125
1974	0.49	195.0	95.55	14.1	.173
1975	0.46	228.0	104.88	9.3	.097

TABLE 5

ANTIGUA:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962		94.7			
1963		96.2			
1964		100.0			
1975	0.58	99.9	57.9		
1966	0.58	98.8	57.3	- 0.6	- .01
1967	0.57	105.8	60.3	3.0	.05
1968	0.50	114.0	57.0	- 3.3	- .055
1969	0.50	118.8	59.0	2.0	.035
1970	0.50	126.1	63.0	4.0	.068
1971	0.50	137.3	68.7	5.7	.090
1972	0.52	149.2	77.5	8.8	.014
1973	0.52	168.1	87.4	9.9	.127
1974	0.50	204.5	102.25	14.8	0.169
1975	0.50	231.1	115.55	13.30	0.130

TABLE 6

DOMINICA:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$\frac{(ExP)_t-(ExP)_{t-1}}{(ExP)_{t-1}}$
1962		97.0			
1963		98.5			
1964		100.0			
1965	0.58	100.0	58.0		
1966	0.58	101.8	59.0	1.0	.017
1967	0.57	107.0	60.9	1.9	.032
1968	0.50	110.8	55.4	- 5.5	- .090
1969	0.50	115.6	57.8	2.4	.043
1970	0.50	130.6	65.3	7.5	.13
1971	0.50	137.8	68.9	3.6	.055
1972	0.52	137.1	71.29	2.39	.034
1973	0.52	149.0	77.48	6.21	.086
1974	0.50	212.6	106.3	28.82	.371
1975	0.50	242.4	121.2	14.90	.140

TABLE 7

MONTSERRAT:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962		97.0			
1963		98.5			
1964		100.0			
1965	0.58	105.0	60.9		
1966	0.58	110.2	63.92	3.02	.049
1967	0.57	115.8	66.01	2.09	.033
1968	0.50	121.6	60.8	- 5.21	- .079
1969	0.50	129.3	64.65	3.85	.063
1970	0.50	137.1	68.55	3.90	.060
1971	0.50	160.4	80.20	11.65	.169
1972	0.52	163.4	84.96	4.76	.095
1973	0.52	179.4	93.28	8.32	.098
1974	0.50	212.7	106.35	13.05	.139

TABLE 8

ST. KITTS:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962		95.2			
1963		97.6			
1964		100.0			
1965	0.58	100.6	58.46		
1966	0.58	101.4	58.81	0.35	.006
1967	0.57	103.8	59.17	0.36	.006
1968	0.50	114.1	57.05	- 2.12	- .004
1969	0.50	117.9	58.95	1.90	.033
1970	0.50	136.5	68.25	9.30	.158
1971	0.50	134.2	67.10	- 1.15	- .017
1972	0.52	142.6	74.15	7.05	.105
1973	0.52	157.4	81.84	7.69	.103
1974	0.50	202.0	101.00	19.16	.234

TABLE 9

ST. VINCENT:

YEAR	ε	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962		94.3			
1963		97.1			
1964		100.0			
1965	0.58	103.0	60.20		
1966	0.58	107.9	62.58	2.38	.040
1967	0.57	111.0	63.27	0.69	.011
1968	0.50	114.0	57.0	- 6.27	- .099
1969	0.50	118.9	59.45	2.45	.043
1970	0.50	123.8	61.9	2.45	.041
1971	0.50	128.7	64.35	2.45	.040
1972	0.52	144.9	75.34	10.99	0.170
1973	0.52	168.5	87.62	12.32	0.163
1974	0.50	228.9	114.45	26.83	0.306

TABLE 10

ST. LUCIA:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962		95.2			
1963		97.6			
1964		100.0			
1965	0.58	104.3	60.49		
1966	0.58	106.8	61.94	1.45	.024
1967	0.57	110.2	62.81	0.87	.014
1968	0.50	114.6	57.3	- 5.51	- .088
1969	0.50	117.2	58.6	1.3	.023
1970	0.50	132.9	66.45	7.85	.134
1971	0.50	144.1	74.93	8.48	.128
1972	0.52				
1973	0.52				
1974	0.50				

TABLE 11

GRENADA:

YEAR	E	P	ExP	$(ExP)_t-(ExP)_{t-1}$	$(ExP)_t-(ExP)_{t-1} \div (ExP)_{t-1}$
1962		97.0			
1963		98.5			
1964		100.0			
1965	0.58	101.3	58.75		
1966	0.58	105.5	61.19	2.44	0.041
1967	0.57	111.7	63.67	2.48	.041
1968	0.50	121.6	60.8	- 2.87	- .045
1969	0.50	129.6	64.8	4.0	.066
1970	0.50	135.8	67.9	3.1	.048
1971	0.50	142.6	74.15	6.25	.092
1972	0.52				
1973	0.52				
1974	0.50				

TABLE 12

REAL EXCHANGE RATE VARIANCES IN CARICOM

	Actual Variance	Equilibrium Variance	Calculated F	Critical F
CASE A				
df 36; 36	0.195	0.0387	5	2.26
CASE B				
df 64; 64	0.0712	0.0663	1.07	1.76
CASE C				
df 50; 50	0.0327	0.0176	1.86	1.94