

AN EXCHANGE RATE INDEX FOR BARBADOS

by

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Exchange Rate indices (ERIs) were devised to indicate over or undervaluation of a currency in relation to several foreign monies. Despite their widespread use ERIs are not very reliable and they often give perverse signals. The International Monetary Fund publishes "Effective Exchange Rate Indices" for countries which agree to allow them to do so. The Caricom countries (members of the Caribbean Economic Community) for which the IMF publishes indices are Guyana and the member states of the East Caribbean Central Bank (ECCB). The published indices may well indicate over-valuation when the currency is in fact underdevalued or when it is quite impossible to make a confident judgement.

Our paper sets out one method of calculating an effective exchange rate index for Barbados. It is based on the probable effect of exchange rate changes on the current account of the balance of payments. This is not the only relevant way to judge whether the exchange rate is appropriate. Exchange rate changes have very powerful inflationary effects. In some cases it may be better to base one's judgement about the exchange rate on its effect on inflation; better still, one may judge by the effects on growth. If a country succeed in sustaining a current account deficit over many years of steady growth it may be undesirable to change that exchange rate. Although we stay with the current account effects as the basis for judgement in this paper we need to bear these qualifications in mind as we proceed.

Methodology

The index must reflect the combined effects of changes in several currencies: the US dollar, the Canadian dollar, the pound, regional currencies, the yen, deutschemark, etc. All indices are ways of assigning a weight to each currency change. We wish to assign a weight which reflects that currency's contribution to a change in the current account. Suppose there is a uniform percentage change in the value of each currency: by how much will the current account change? What contribution to the overall change is due to sterling? That contribution is the weight to be assigned to sterling. Similarly, the weight assigned to each other currency is proportionate to its contribution to the overall current account change.

In order to calculate the current account changes we choose four major currencies of interest to Barbados: the US dollar, the Canadian dollar, sterling and the Trinidad & Tobago dollar. We also choose the three major items of the current account: exports, imports and tourism. Altogether, this combination accounts for 90% of tourist receipts and 70% of trade transactions. We estimate the reaction of exports to the US to changes in the US dollar, of exports to the UK to changes in the value of sterling and similar reactions for the other two currencies. We then perform the same calculations for imports from each currency area and for tourist arrivals from each currency area. In our estimation we ignore how exports to the US

might respond to changes in the value of sterling but we suspect such substitution effects are not of much significance.

We believe that exports increase if the price of exports rises relative to domestic operating costs, comprising mainly wages and finance costs. An increase in supply will follow an increase in export prices, supposing that costs remain unchanged. We assume that producers already have the required plant and enough excess capacity to provide the additional supply. If new investment or retooling is required the delay in the supply response will be quite long. It must therefore be understood that we are measuring short-run current account responses and that the index we derive will be appropriate only for the short-run.

For exports of manufactured goods and sugar Barbados' output is so small that sales are typically not affected by economic performance in the buying countries. (The exception is sales to Caricom but even here Barbados' exporters seem to do well once barriers to trade are removed.) In tourism, however, economic performance in the tourists' countries of origin does seem to matter. This is suggested by general observation as well as empirical evidence in a paper by Clarke, Wood and Worrell (Central Bank of Barbados Economic Review, June 1986). Estimates of the demand for holiday travel to Barbados are therefore based on the real national income in the main countries from which tourists come and the prices in those countries relative to

prices in Barbados. We might have included the prices of other tourist destinations competing with Barbados but for the difficulty of choosing the most appropriate competitors. For some tourists the alternative might be another East Caribbean destination, for others, Mexico or the Dominican Republic and for still others Europe or some distant destination.

Import requirements depend on Barbados' real GDP and the prices of imports from each country relative to the prices of domestic substitutes. We do not make allowance for a change in one exchange rate to lead to substitution of imports from another source though it seems that such adjustments would be made. In fact there is surprisingly little substitution of this kind. It is true that many items which were once obtained from the US and elsewhere are now sourced from Brazil but only a small proportion of the business in each of these lines has been diverted and only where the price differential has been sustained over many years. We believe these effects are sufficiently insubstantial to be neglected in a global study.

The results we have obtained are preliminary and may well be modified by the use of firmer data (which will require many months to produce) and more discriminating use of statistical criteria, which is probably not justified until better data become available. In response to a 10% devaluation of the Barbados dollar with respect to each of the four currencies the

change in exports ranges from a 5% fall in exports to Canada to a 10% rise in exports to the UK. There is almost no effect on tourism from Canada but arrivals from the UK increase by almost 8%, with US tourism almost as responsive. The devaluation hardly affects imports from the United Kingdom but imports from the US are depressed by almost 11% (Table 1.)

We now begin the computation of the exchange rate index by calculating the net effect of all these changes on the current account measured in Barbados dollars. The percentage of the total which is contributed by sterling is calculated and the percentage is used as the weight for sterling for each year. Similarly, the contribution of each of the other three currencies is calculated to be used as the weight for the currency. These calculated weights are then applied to the actual changes in the exchange rate for each currency each year in order to derive the index. (Note that whereas the rates are calculated on the basis of a hypothetical devaluation of the Barbados dollar, implying an equal change in the value of all foreign currencies, the observed foreign currency changes which produce the index will vary from currency to currency.) We use a different set of weights each year because the weights depend on the value of the current account in the previous year; the same percentage change will give a larger effect if the value involved in the previous year's current account were larger.

Interpreting the Index

All currencies are measured as a value of the foreign money in terms of Barbados dollars: the value of the US dollar is two Barbados dollars and the value of the pound in the region of three dollars and fifty cents. A depreciation of the Barbados dollar implies a rise in the value of foreign currency. A rise in the exchange rate index therefore indicates depreciation of the Barbados dollar. Implications about over or undervaluation can be made only if the current account improves when the index rises. To say a currency is overvalued implies that the exchange rate outturn may be improved by depressing its value. In fact the current account does improve as the exchange rate for Barbados rises.

In order to determine the extent of over or undervaluation we must choose an appropriate base. We require a year when the current account is in balance or in surplus because conventional wisdom holds that a current account deficit cannot be sustained indefinitely. No matter how often we observe current account deficits they are an abnormality; eventually, the country must generate surpluses to service the capital which has come in to fill the current account gap. We should also choose a year of growth and low inflation; it is possible to produce current account surpluses by severely reducing incomes directly or by very high inflation, but that is not a desirable situation. We

are therefore searching for a base year which features a current account surplus, growth in real income and low inflation. Moreover, the income growth and the modest inflation should be sustained for several years in the neighbourhood of the base year. One good year in the midst of a period of economic decline would not qualify. For Barbados the only candidate years since 1970 are 1984 and 1985. They are the only years when the current account was not in deficit. We choose 1984 as the base year - along with a surplus of \$22 million in the current account we observe a growth rate of 3.6% and a rate of inflation of 4.6%. In 1985 the current account surplus was \$81 million but the growth rate had declined to 1.1% though the inflation rate was 3.9%. Nonetheless, strong reservations remain about considering either 1984 or 1985 as equilibrium years. In both years there was insufficient investment in new exports to ensure long-term robust growth. We used 1984 as the base year, not out of conviction, but because we have no other plausible choice.

There has been very little movement in the effective exchange rate (based on 1984) since the mid-1970s (Chart 1). The rate appreciated by about 15% between 1970 and 1977 but the index for 1987 was about the same as for 1978. In the interval there was a small depreciation of about 10% to 1980 followed by an appreciation of about the same amount to 1986. It seems that, if anything, the currency was somewhat undervalued in the early

1970s and that its value has been roughly correct since the mid-1970s.

This interpretation ought to be modified somewhat. The current account reacts only to relatively large changes in prices. Changes in exchange rates which resulted in a shift of only about 5% are unlikely to provoke any change in the current account. When do exchange rate changes and price changes become large enough to matter? It is possible to filter out changes below a certain size and test for the current account reaction from all others but this has not yet been done. General observations suggest that changes of less than 10% in the exchange rate are unlikely to have any effect. We might therefore consider the 'equilibrium' exchange rate index as a band of 10% on either side of the mean value for the base year. Any value between 0.9 and 1.1 would indicate an appropriate exchange rate. The exchange rate is overvalued only if the index falls below 0.9, reinforcing the opinion that the value of the Barbados dollar has been appropriate since the mid-1970s.

In contrast, exchange rate indices using trade shares as weights indicate rather more significant appreciation of the Barbados dollar since the late 1970s (Chart 2). Indices based on import shares or shares of each currency in trade and tourism indicate a 20% appreciation between 1970 and 1976 and another 10% between the end of the 1970s and 1984. If the trade weighted indices are

modified by a ratio of foreign retail prices to Barbados' retail price the appreciation of the Barbados dollar appears even more dramatic. There is an appreciation of almost 50% between 1970 and 1976 with a further appreciation of 15% between the late 1970s and 1984. Conclusions drawn from these indices would mislead. They would be even more misleading if an arbitrary base year were chosen. For example, the IMF uses 1980 as the base year for indices calculated for all countries. That clearly is not an equilibrium year for most. For Barbados it would quite wrongly indicate an 11% overvaluation in 1986.

We have not yet decided whether the exchange rate as indicated by the index may be appropriate in the long run. The index based on the current account measures only short-term responses. Balance of payments analyses indicate that short-term and long-term effects may be in opposite directions. A change in the exchange rate may have delayed effects on the domestic costs which reverse the initial effects; in our estimates, wages and interest rates do not change when currencies' valuations change but typically a large devaluation will drive up wages, even if they do not rise by the same percentage as the devaluation. Devaluations are invariably accompanied by increases in finance costs, by more than the proportion of devaluation if the monetary authorities are confronted with a severe problem of capital flight. To the degree that wage and interest rate reactions are important in Barbados the exchange rate index overstates the extent of

overvaluation by suggesting unrealistically large long-term effects of devaluation. The actual calculation of the exchange rate index may not change very much since the weights for the currencies always sum to unity no matter how small or large the current account effect. However, the band within which we should consider the rate appropriate is probably much wider than we have suggested - perhaps as large as 20% on either side of the mean value in the base year. Anything less than a 20% devaluation is hardly worthwhile. Once all the domestic costs reactions are accounted for a smaller devaluation will leave the country with much the same current account as without the devaluation.

While these results are plausible they remain tentative. Sound data are available for nominal exports and imports, tourism, real incomes, interest rates, consumer prices and wages. Import prices had to be calculated for each currency area using relative prices among foreign countries. The observed import price must be made up of import prices for each currency area, weighted by the share that the area contributed to total imports. If these area import prices are related to the US import price in the same way as the area retail price indices are related to the US retail price index we can infer the values of the area import prices. For export prices we have no direct observations; we assume that they vary in proportion to the unit value of imports into the four countries analysed, modified by changes in their exchange rates. Where unit values of imports were not available we used

retail prices for the destination countries. The results make sense and they may be accepted for the time being though for most of our estimating equations the conditions for reliable inference do not hold and we are unable to evaluate the reliability of the estimates obtained.

Conclusion

We cannot be quite sure, but perhaps the Barbados dollar is not overvalued after all. Moreover, the policy of maintaining a fixed US dollar parity seems justifiable. The exchange rate index has not been outside of a range that might be considered equilibrium ever since that parity was fixed in 1975. In any case, policy makers should be wary of basing a devaluation strategy on effective exchange rate indices. Even a well-constructed index such as the one we have put forward, using fully reliable data (a criterion which we only partially satisfy) and statistically robust estimates (which we do not yet have) would need to be used with care. It could not capture all the long-run effects and all the possible implications of exchange rate changes for inflation, economic structure, industrial relations and investment. These would have to be explicitly evaluated along with the exchange rate index.

Chart 2. Alternative Exchange Rate Indices

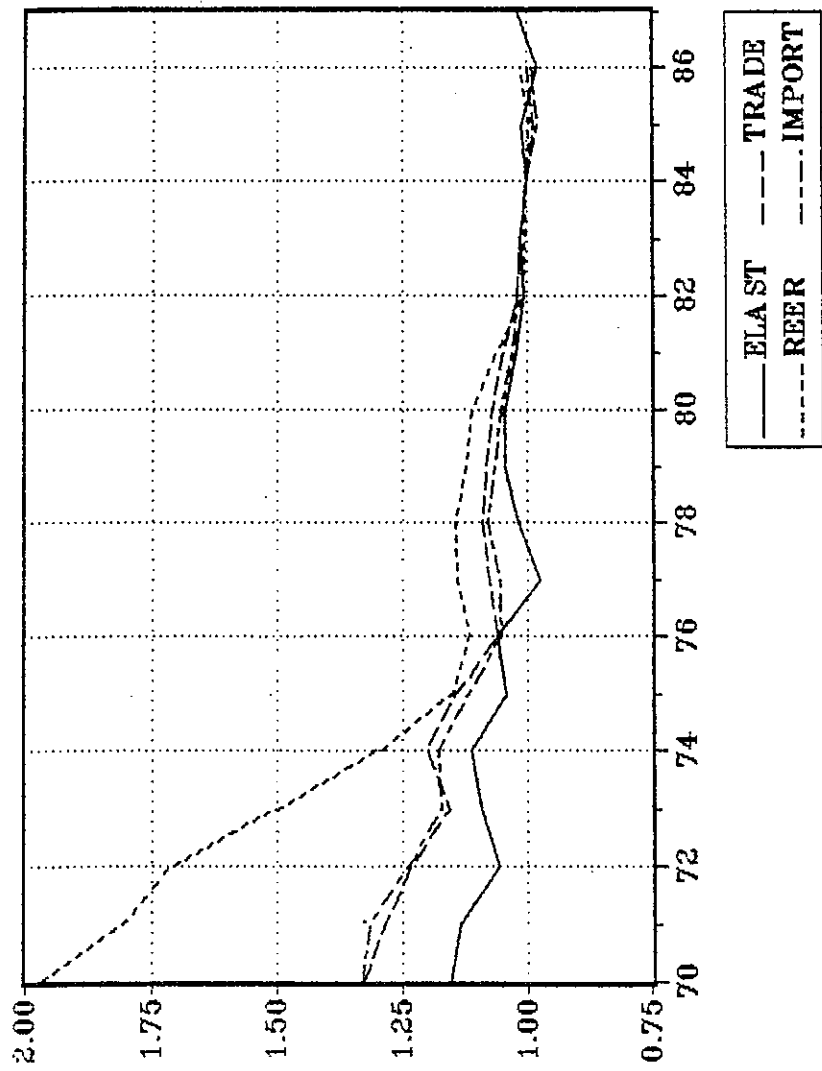
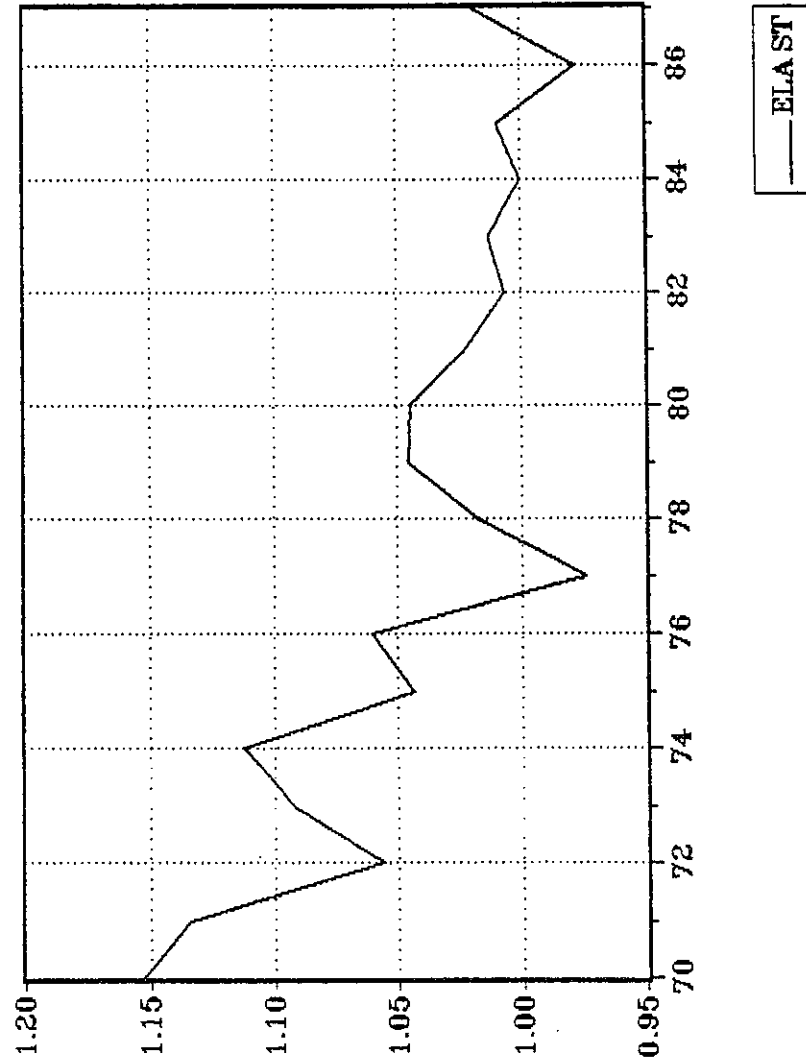


Chart 1. Exchange Rate Index (Elasticity Weights)



obs	ELAST	REER	TRADE	IMPORT
1970	1.152274	1.966938	1.324771	1.328186
1971	1.134346	1.804708	1.283220	1.313979
1972	1.055801	1.710556	1.230322	1.235925
1973	1.091813	1.500802	1.154872	1.171578
1974	1.111897	1.294720	1.201321	1.177644
1975	1.042985	1.150253	1.143088	1.118875
1976	1.060174	1.116730	1.058940	1.052892
1977	0.974046	1.141219	1.076997	1.055133
1978	1.017854	1.143876	1.090319	1.079469
1979	1.045104	1.122330	1.082261	1.063614
1980	1.044366	1.110786	1.069698	1.052726
1981	1.022564	1.060105	1.048529	1.028700
1982	1.006360	1.006140	1.018898	1.019087
1983	1.012823	1.002938	1.013992	1.013849
1984	1.000000	1.000000	1.000000	1.000000
1985	1.009416	0.994276	0.985305	0.976636
1986	0.978007	1.012684	0.999036	0.989978
1987	1.018934	NA	NA	NA

NOTE

ELAST: index based on elasticity weights
 REER: trade weighted index, adjusted for relative price changes
 TRADE: trade weighted index
 IMPORT: import weighted index.

Mean Values of Price Elasticities

Country of Origin/ Destination	Real Value of Exports	Real Value of Imports	Tourist Arrivals
US	0.41	-1.08	0.72
UK	0.96	0.03	0.76
Canada	-0.52	-0.23	0.03
Caricom	0.11	-0.55	0.46

Note: Estimating equations of the form:

For exports $x_i = f(px_i, w, r)$

For imports $m_i = f(y, pm_i/p)$

For tourism $t_i = f(y_i, p_i/p)$

All estimates in logarithmic form.

The variables are:-

x_i : real exports	px_i : price of exports
m_i : real imports	pm_i : price of imports
t_i : tourist arrivals	w : wages
i : each of 4 currency areas	r : loan interest rate
y_i : real income	P : RPI

(Home country variables have no subscript)