The Composition of Exports and the Impact of Economic Policies

by

DeLisle Worrell

Central Bank of Barbados

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Export oriented growth is widely accepted as the essential development strategy for small open economies. Although a minority of economists pressed for regional alliances among small nations, coupled with a joint import substitution policy, that path was never really feasible. The diversity of consumption needs and of input requirements for production, once one moves beyond the subsistence economy, ranges far beyond the potential of a small economy. However, a high rate of trade to national income exposes a country to severe disturbances from fluctuations of the world economy. It is necessary to devise policies that will cushion the external impact and that will allow policy makers in the small nation to exercise a deciding influence on the stability and growth of the economy.

It proves very difficult to identify in general a set of policies which will improve the flexibility of small economies' response to external events. One may obtain a variety of results about the appropriate mix of policy, depending on the characteristics of export markets, the elasticities of supply and demand functions, the development of the country's infrastructure, the sophistication of financial institutions, and a number of other factors. Furthermore, much of the theory underlying the relationship between policy and performance remains the subject of debate, and crucial questions of the timing of impact and response cannot be generalised. We therefore adopt a specific approach, devising a model which embodies characteristics typical of the small Caribbean economies we intend to investigate. This paper focuses in particular on a breakdown of export industries to reflect the varying arrangements under which they are marketed and the range of elasticities of response to prices and changes in the level of activity. The model is used to explore the effects of fiscal, monetary and exchange rate policies on the growth rate, the balance of payments, inflation and employment in Caribbean economies.

The model disaggregates exports into four groups, distinguished by their marketing arrangements. Some markets are administered, some products are differentiated and some processes feature long supply lags. Domestic spending is driven by the earnings from exports, by fiscal expansion and by foreign capital inflows. Purchases comprise mainly imports and non-tradeable goods, with only a very small consumption of locally produced tradables. The non-tradable market adjusts to clear demand and supply with a lag. Prices depend on the sources of goods and services consumed - imports and non-tradables - and on customary retail markups. Employment is determined jointly with output, on the assumption of fixed factor proportions. The model deals only with adjustment in the short run.

The first section of the paper provides a description of the model. It is followed by an exploration of the policy adjustment mechanisms embodied in the model. The third section

gives examples of the magnitude of policy effects, drawing on empirical tests for Caribbean countries. The final section discusses refinements and developments to be undertaken with the model.

1. The Model

The model uses the Solow-Swan tradable/non-tradable distinction as its point of departure, disaggregating the tradable sector into four types of activity. These are exports, represented in the Caribbean mainly by tourism, where even the small economy may establish a distinct character and a specialised clientele. For these products the small country faces a downward-sloping demand curve. A second group of exports, comprising manufactured goods for the most part, conform more closely to the expected demand condition for a small economy: sales may be as large as the supply curve will allow. The mineral sector and some manufacturing concerns are operated as enclaves within the economy; they form a third category, where output depends on local costs and other circumstances, relative to those in competing locations. The fourth class of exports comprises agricultural items where there are considerable supply lags. Domestic consumption of tradables is small enough to be neglected, in the interests of containing the dimensions of the model.

Prosperity in the export sector will stimulate demand for non-tradables and for imports, affecting prices and the balance of payments. Apart from an export boost, output may be affected by an increase in the uncovered fiscal deficit or a capital inflow. Both will be inflationary, and the fiscal deficit will also weaken the balance of payments.

The equations fo the model are listed with explanatory notes in what follows. All variables are expressed in rates of change.

Output in the 'tourism' sector is determined on the demand curve, with the supply of hotel accommodation fixed in the short run. The demand for tourism services is given by

(1) $q_h = q_h\ (y_i,\ P+e_i-P_i-e,\ P+e_j-P_j-e)$, i= 1, 2,...j = 1,2,...

where the q's are constant values of tourism services, y is an index of real income in the tourists' countries of origin, the i are the countries of origin, the j are rival tourism destinations with comparable facilities, e is the value of domestic currency in terms of a numeraire and e_i and e_j the values of currencies i and j in terms of the same numeraire. P_i is the general consumer price in i, while P_j is the price of tourism services offered by j. Demand varies with income, the prices of tourism services relative to other things in the tourist's budget, and the relative prices of competitive tourism packages.

In the 'mineral' sector (which includes some manufacturing) the multi-national corporations which manage operations have global output targets which, from the point of view of the small economy, may be taken for granted. The desired output will be allocated among the companies' facilities in many

countries according to changes in marginal domestic costs. The principal local costs are wages and official levies, giving the following equation for determining output:

(2) $q_l = q_l(q_l^*, w+e_i-w_i-e, tl-e-tl_i+e_i)$

where q_l^* is the company's global target output, w an index of domestic wages, w_i wages in alternative producing locations and tl is a measure of the tax liability per unit of output.

In the manufacturing sector the demand is boundless in comparison with the amount that may be supplied by the producers in the small economy. However, the selling price is fixed, and output will be limited to the volume that may profitably be produced at that price:

(3) $q_f = q_f(P_i-e_i+e, (1+ti)Pm, w, r)$

This is the equation of the supply function, with P_i the product price measured in foreign currency, P_m the price index for imported raw materials, ti the tariff on these materials, w an index of unit labour costs and r the cost of financing working capital.

In the agricultural sector output varies with non-economic factors which affect the yield from any given acreage. Yields vary with the weather, the incidence of plant disease and infestation and changes in husbandry. Actual output corresponds to the farmer's intentions only by accident. Those intentions may be governed by economic factors. We assume that agricultural exports face demand conditions similar to those for manufacturing and that farmers will gear their plantings along a supply function to a level suggested by the ruling market price. These intentions come to fruition in some future time period. Current output reflects decisions of a previous period, based on anticipated prices and costs in the current period. Expectations are assumed to have been based on earlier performance. Output therefore depends on a supply function whose arguments are lagged costs and prices, together with the non-economic factors affecting yields:

(4) $q_a = q_a(P_i(-t)-e_i(-t)+e(-t), P_m(-t), w(-t), r(-t), z_1, z_2, \ldots), t = 1, 2 \ldots$

where P_i are the prices of agricultural products sold to country i and t indicates the time period; the z's are measures of the non-economic factors affecting output.

In the non-tradable sector producers perceive a demand which varies according to

(5) $q_n^* = q_n^*(y, P_n-P_m, d, k)$

y is national income, which determines the level of spending. Buyers choose between non-tradables and imports on the basis of relative prices ($P_n - P_m$). Injections to the income stream which will raise the level of spending include money created to finance an uncovered fiscal deficit (d) and capital inflows (k). Producers adjust to the discrepancy between demand and output levels in the previous period to an extent shown by

(6) $q_n = s(Q_m^* - Q_n(-1))/Q_n(-1), 0 \leq s \leq 1$

The capital letters indicate levels of output. That output is priced according to the supply schedule

(7) $P_n = P_n(q_n, (1+ti)P_m, w, r)$

The balance of payments improves with gains in export activities described above and weakens with increases in imports given by

(8) $m = m\ (y, P_n - P_m, d, k)$

reflecting the choice between imports and non-tradables in the expenditure basket. Capital inflows (and outflows) are made up of autonomous long term capital and short term flows which may be stimulated by anticipated exchange rate changes and by differentials between domestic and foreign interest rates:

(9) $k = kl + ks$

(10) $ks = ks\ (E(e), r-r_i)$

kl and ks are long and short term net capital inflows, respectively, and E( ) is the expected value.

For the purposes of the present model we have distilled out the fiscal and monetary impulses which have an impact on the real economy. (A structural model of the monetary sector, from which the effects appearing in the present paper may be derived, appears in Worrell [1984].) The mechanisms by which fiscal and monetary changes alter output and expenditure are money creation resulting from a fiscal deficit (d), tariffs affecting domestic price levels (ti) and increases in bank finance costs (r). Changes in the fiscal deficit may be represented by the identity

(11) $D' = G' - (1+ti)(M+Q) - td.Y$

where the dashes represent changes and capitals indicate levels. Y is the level of nominal income. G' is the change in government expenditure and td is the rate of direct taxation. This identity embodies an assumption that the underlying fiscal position is consistent with the private net demand for money before any adjustment to expenditure or tax rates. If it is not, the change in the fiscal position need not lead to government borrowing from the central bank. Furthermore, the central bank is unable to manipulate private demand for money by adjusting the interest rate, as explained in the 1984 paper. Finally the identity abstracts from any overseas borrowing by government. This creates no difficulty unless we have reason to believe that capital inflows for government will affect output and spending differently from the same inflow to the private sector, since the impact of all capital inflow, public and private, is accounted for by k. Equation (11) tells us what values of d and ti should be incorporated into other equations of the model, for any change in fiscal policy. The 1984 paper considers the possibility of sources of monetary expansion apart from fiscal expansion and capital inflow, and explains why they are unlikely to be of importance in the Caribbean.

The loan interest rate is set by the commerical banks to maximise their profits, given the demand for credit, the supply of deposits, the need to maintain a relationship between

domestic deposit rates and those abroad (so as to discourage speculative short-term capital movements) and the cost of borrowings from the central bank. A reduced form equation for determining loan rates may be derived in the form

(12) $r = r\ (P+y,\ r_b,\ r_i)$

where r_b is the central bank discount rate. (In some countries loan rates have been dictated by the central bank from time to time; on such occasions equation (12) is replaced by the administered rate.)

Domestic retail prices are fixed by marking up the ex-factory prices of non-tradables and the landed prices of imports, in both cases after allowing for the tariff. The size of the mark-up may be inferred from estimates of the price determining equation

(13) $RPI = P((1+ti)P_m,\ (1+ti)P_n)$

Wages are a result of bargains struck between employers, who are guided by the marginal productivity of labour, and workers, who hope to maintain real wage levels in the face of expected inflation. The outcome depends on the relative bargaining power of the contending parties, and may be inferred from the wage equation

(14) $w = w(y-n,\ E(RPI))$

n is the rate of change of employment, and the first term is therefore a measure of productivity change. Employment is simply a function of the level of output in the short run:

(15) $n = n(y)$

The nature of that relationship may change over time with changes in the relative size of the producing sectors and with new technology, but we expect such changes to be gradual, so that the relationship should be sufficiently stable for year to year changes. The full model is summarised for convenience in Table 1.

2. The Effects of Exchange Rate, Fiscal and Interest Rate Policies

A devaluation - an increase in the value of e - stimulates the output of exports. The demand for tourism rises provided prices are fixed in local currency (i.e. the price set is P rather than (P-e)), to an extent determined by the own price elasticity and price elasticity relative to competitors, in each potential market. The supply curve for manufacturing shifts outward (as foreign buyers see it) and output rises; the increase is larger the smaller the proportion of imports used to produce manufactures. The competitive local costs for mineral production fall, improving the prospects for attracting additional output to the local plant.

The income created by the additional exports creates demand for non-tradables and imports. The devaluation increases import prices and deflects demand to non-tradables, whose prices and volumes both rise. Whether the balance of payments improves depends on the export response, the propensity to import out of additional income and the elasticity of import demand with respect to relative prices. It also depends on private sector evaluation of the exchange rate strategy. If the devaluation is

thought to be inadequate, for example, there will be an outflow of short term capital. We cannot depend on interest rate changes to counteract the speculative outflow: although interest rates may be pushed up by income and price rises, the interest rate effect is seldom sufficiently powerful to discourage speculation. Devaluation generates inflation, directly through the price of imports and indirectly via the rising demand for non-tradables.

The wage reaction depends on how price expectations are formed. If workers believe that the future resembles the past wages will increase only after some delay. That will exacerbate inflation, dampen the expansion of output and reduce the bias against imports. The other delayed reaction is an increase in the supply of agricultural products, tempered somewhat by rising wages.

Devaluation expands output but is inflationary. The magnitude of the reaction depends on the mix of exports, the price elasticities and the propensities to spend. These parameters also determine whether or not the balance of payments improves.

Fiscal policies in the model are of two kinds: tariffs, which alter prices and cause an injection or withdrawal of money at the same time, and extra spending and direct taxes, which have only the money creation/destruction effect. In this exposition we assume there is a single tariff rate which applies to all ex-factory, form gate, service and import prices, and that all exports are exempt. However, the model will accommodate particular tariffs without difficulty.

An increase in tariff will depress output by raising costs. There is further contraction as lower output means slackening demand for non-tradables. Furthermore, government's deficit falls and money is destroyed, further depressing demand for non-tradables. The balance of payments should improve as the fall in income, the increase in prices of tariff-ridden imports and the destruction of money all conspire to depress imports. The tariff may be inflationary, but the fall in the demand for non-tradables should dampen the inflationary pressure exerted by the tariff.

A policy to raise interest rates - an increase in discount rates together with tightening liquidity requirements, for example - will tend to depress output by raising finance costs in manufacturing, agriculture and non-tradables, the sectors which rely on the banking system to finance working capital. The capital account of the balance of payments should strengthen as the higher rates attract short-term capital. (Foreigners are unlikely to shift funds to the Caribbean in search of higher interest rates; the net inflow arises out of a change in the use of foreign trade credits by resident firms, the slowdown of dividend outflows by subsidiaries of foreign companies and the swifter repatriation of export proceeds.) The

overall balance of payments strengthens only if the short term capital inflows outweighs the loss in exports because of cost increases. Rising interest rates are inflationary because of finance costs.

The Magnitude of Policy Effects

Before embarking on full scale estimation of the model we thought we might gather together and analyse results from existing studies which could illuminate the nature of policy response. The existing work features methodologies which have not been made consistent with one another and the model specification may differ somewhat from the presentation above. However, specialised sectoral studies may offer a wealth of detail which is difficult to incorproate in an aggregate study. For the moment we report only on results for Barbados, drawn from studies of tourism by Clarke, Wood and Worrell [1986], of sugar by McGregor et al [1979], and of the aggregate economy by Boamah et al [986], supplemented by preliminary estimates prepared for the present paper.

The tourism study estimates demand equations for market segments differentiated according to tourists' country of origin, the type of hotel accommodation used and the season of travel. The authors investigated the effects of tourists' incomes, Barbados' hotel rates, rates in a rival destination and airfares. All rates were measured in US dollars so that changes in the Barbadian rate of exchange would be reflected in the price offered to the potential traveller. The overall price elasticity, weighted by the share of each segment in total tourist activity, is a low -0.04. The mean values of the price elasticity for those segments where the elasticity was estimated to be significantly different from zero appear in Table 2.

For the manufacturing sector we have a single equation estimate, prepared for this study. Manufacturing which was in the hands of foreign multinationals was excluded from the estimate. A single index averaging all export prices was used to replace the country-specific export prices in equation (3). The result, which should be regarded as preliminary, was

$$(16)\quad q_f = \underset{(2.02)}{5.43} - \underset{(-1.67)}{0.59P_f} + \underset{(2.05)}{0.77P_m} - \underset{(-0.57)}{0.02r} - \underset{(-0.33)}{0.11w}$$

$$\bar{R}^2 = 0.9821,\ SE = 0.13,\ Rho = 0.95,\ F = 254.02,\ h = \underset{(15.53)}{0.82}$$

with t-statistics appearing in brackets. The first run suggested the presence of autocorrelation and the first order autoregression coefficient (Rho) proved significant. The statistic h, recommended for use in equations with lagged dependent variables, suggests there is no further autocorrelation.

We believe, on the basis of this result, that the elasticity of response to a devaluation (or movement in foreign prices) may be in the range -0.08 to 0.49. The coefficients of P_f and P_m are probably unreliable because the covariance of the prices seems high (-0.022) compared with their covariances with

the other explanatory variables (absolute values in the region of 0.005 to 0.007, for the most part). We therefore calculate the elasticity on the basis of the combined coefficients, including a range which varies two standard deviations (in terms of the combined variances) on either side of the mean net effect. Tariff rate modifications were not specifically accounted for so that the coefficient of P_m will reflect their influence, to some extent.

In the agricultural sector output seems to have fallen when prices rose (Welch [1986]). The supply also depends critically on factors affecting yield - harvesting procedures, cultivation techniques and weather conditions - as reported in McGregor et al (p.).

For the output of non-tradables we do not as yet have results which correspond to the current specification. An earlier test included real government services as a determining variable instead of monetary expansion, but apparently suffered by the collinearity of that variable with the output of tradables (indicated by a relatively high value for the covariance).

Estimates for the remaining equations are borrowed from Boamah et al. The price of non-tradables is highly responsive to demand, import prices and wages - the mean value of the elasticity in each case is about 0.5 to 0.6 - but not sensitive to interest rate changes. The loan interest rate reacts to changes in overseas rates rather sluggishly, with an elasticity of 0.2. Retail prices are highly sensitive to the prices of non-tradables (an elasticity of 0.8) but much less so to import prices (an elasticity of only 0.1). Wages respond to price changes one year earlier with an elasticity of unity, and to changes in output per worker with an elasticity of 0.8.

The Next Steps

New estimates for the output of non-tradables in Barbados are to be prepared and the results of the last section combined to illustrate how exchange rate changes, tariff changes, uncovered public deficits and interest rates influence prices, output and the balance of payments. A similar exercise of pulling together available results will be performed for Jamaica, Trinidad-Tobago and other Caribbean nations. If data permit, a full estimation and simulation of the current model may be undertaken. The model is to be adapted to incorporate investment incentives and responses, so as to address the long term questions of the relative growth of capacity in various sectors.

DeLisle Worrell
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Table 1

The Equations of the Model

1. $q_h = q_h\ (y_i,\ P+e_i-P_i+e,\ P+e_j-P_j+e$
2. $q_l = q_l\ (q_l^*,\ w+e_i-w_i-e,\ tl-e-tl_i+e_i)$
3. $q_f = qf\ (P_i-e_i+e,\ (1+ti)P_m,\ w,r)$
4. $q_a = q_a\ (P_i(-t)-e_i(-t)+e(-t),\ P_m(-t),\ w(-t),\ r(-t),\ z_1,\ z_2,\ \ldots)$
5. $q_n^* = q_n^*\ (y,\ P_n-P_m,\ d,\ k)$
6. $q_n = s\ (Q_n^* - Q_n\ (-1))/Q_n\ (-1) \qquad 0 \leqslant s \leqslant 1$
7. $P_n = P_n\ (q_n,\ (1+ti)P_m,\ w,\ r)$
8. $m = m\ (y,\ P_n-P_m,\ d,\ k)$
9. $k = kl + ks$
10. $ks = ks\ (E(e),\ r-r_i)$
11. $D' = G' - (1+ti)(M-Q_n) - td.Y$
12. $r = r(P+y,\ r_b,\ r_i)$
13. $RPI = P\ (1+ti)P_m,\ (1+ti)P_n)$
14. $w = w\ (y-n,\ E(RPI))$
15. $n = n(y)$

Table 2

Elasticities for Tourism

(With respect to Barbados' hotel rates)

Category		Elasticity
Winter, weighted avg.		-0.087
US	Guest Houses	-1.59
	Apts	2.04
Can.	Luxury	-1.34
	A-Class	2.45
	B-Class	0.88
UK	A-Class	4.12
	B-Class	-1.46
	Apts	1.94
Summer, weighted avg.		-0.005
Overall		-0.04

Source: Clarke, Wood & Worrell [1986]

Table 3

Selected Results: Prices and Wages

Double Log

$$P_n = \underset{(-2.53)}{-4.712} + \underset{(5.19)}{0.630}\, Q_n + \underset{(3.86)}{0.601}\, P_m + \underset{(3.92)}{0.496}\, w + \underset{(1.09}{0.144}$$

$\bar{R}^2 = 0.99$ RHO1 = 0.46 D-W = 1.81

SER = 0.02 (2.64) F = 846.59

$$r = \underset{(6.38)}{1.04} + \underset{(3.55)}{0.433}\, r_d + \underset{(2.32)}{0.178}\, r_f + \underset{(0.13)}{0.002}\, \frac{D}{CR}$$

$\bar{R}^2 = 0.85$ RHO1 = 0.45 (2.36) D-W = 1.90

SER = 0.03 F = 30.16

$$w = \underset{(-7.41)}{4.669} + \underset{(18.67)\ [0.97]}{0.983}\, P_{-1} + \underset{(5.93)\ [1.19]}{0.777}\, \frac{YR}{N} - \underset{(-1.11)\ [-0.07]}{0.177}\, UR$$

$\bar{R}^2 = 0.99$ RHO1 = 0.28 (1.45) D-W = 1.94

SER = 0.02 F = 520.0

$$15.\ RPI = \underset{(3.82)}{0.086} + \underset{(19.09)}{0.758}\, P_n + \underset{(2.12)}{0.137}\, P_m$$

$\bar{R}^2 = 0.998$ RHO1 = 0.38 (2.10) D-W = 1.80

SER = 0.03 F = 4207.2

Source: Boamah et al [1986]