DEVALUATION AND EXPORT EARNINGS IN SMALL ECONOMIES: THE MARSHALL-LERNER OVERSIGHT

FIRST DRAFT

by

Peter Whitehall

RESEARCH DEPARTMENT
CENTRAL BANK OF BARBADOS

JULY 1986

First Draft

Devaluation and Export Earnings in Small Economies: the Marshall-Lerner Oversight

The simplistic form of the Marshall-Lerner condition states that a devaluation will increase the trade balance if the (absolute) sum of the import and export elasticities is greater than unity, while a revaluation will increase the trade balance if the difference is less than unity:

$$dB = KM(e_m + e_x - 1) \qquad (1)$$

where dB is the change in the balance of trade, K is the percentage devaluation, M is the value of imports and e_m, e_x are the import and export demand elasticities. Equation (1) is generally thought simplistic because it assumes that supply elasticities are large and that trade is in equilibrium before the devaluation takes place. A more general form of the above condition drops the assumption of initial trade balance, and assumes only that supply elasticities are large relative to demand elasticities:

$$dB = K[X(e_x - 1) + M(e_m) \qquad (2)$$

$$= \gtrless e_x + \frac{M}{X} e_m \qquad \gtrless 1$$

The imports of a small country constitute a very small percentage of global trade. Thus one would expect the import requirements of a small country to be easily satisfied, particularly if the country is prepared to pay a premium above world prices. However, the demand for imports by the small country is constrained by access to scarce foreign exchange deposits. For these reasons it is reasonable to assume that the supply elasticity of imports is large relative to the demand.

Small caribbean countries with underutilised resources can easily increase their supply of exports in response to favourable prices abroad. This can be achieved simply by making more hotel space available, planting more sugar, bananas, etc., mining more bauxite and expanding manufacturing plants. However, in practice the demand for caribbean exports is partly constrained by marketing arrangements and quality considerations. For these reasons it is reasonable to assume that the elasticity of supply of exports is large relative to demand.

However, the issue of this paper is that an evaluation of the balance of trade which considers only the gross export and import elasticities need not present a water-tight case for (or against) devaluation. This is because the balance of trade combines the disparate elements of foreign earnings and foreign expenditures which often require different corrective action if distortions are not to occur. The balance of trade comprises three distinct elements: the balance of enclave export earnings $d(B_x)$, expenditure on intermediate imports for home consumption/ production $d(M_d)$ and expenditure on consumer imports for home consumption (D Mc). Equation (2) is thus disaggregated as follows:

$$dB = K[X(e_x - 1) + M_i e_i + M_c e_c + M_d e_d] \qquad (3)$$

$$dB_x = d\,(B - Mi) = K\,[X(e_x - 1) + M_i\, e_i] \qquad (4)$$

$$-d(M_c) = K[M_c\, e_c] \qquad (5)$$

$$-d(M_d) = K[M_d\, e_d] \qquad (6)$$

Equation (4) approximates net foreign foreign earnings of the enclave sector. This sector includes all exports of goods and sevices (X), and the imported intermediate and capital goods M_i used in their production. Analysis of the right hand side of equation (4) reveals the condition at which a devaluation would leave net enclave earnings unchanged:

$$\begin{aligned} \text{Let} \quad X(e_x - 1) + M_i\, e_i &= 0 \\ (e_x - 1)/(e_i) &= -M_i/x \\ \text{or } e_x + (M_i/x)\, e_i &= 1 \end{aligned} \qquad (7)$$

The utility of equation (7) is that it emphasizes the importance of value added [or the imput output ratio] in determining the efficacy of exhcange rate adjustment. Equation (7) suggests that net enclave earnings will increase ofter a devaluation if the weighted sum of the demand elasticities for exports and imports exceeds (absolute) unity, and the converse. In fact, a devaluation will be more effective the lower the ratio of value added to exports. In addition, when value added is low, the export elasticity need not be very high for a devaluation to improve net enclave earnings.

However, in the short run the relationship between the quantities of imputs and outputs is fixed, while prices will change only by the amount of the devaluation:

$$\frac{dm}{m} = \frac{dx}{x} \; ; \quad \frac{dPx}{Px} = \frac{dPi}{Pi} = k$$

Thus immediately after a devaluation, the demand elasticities will converge and an equilibrium reached:

$$e_x = e_i = 1/[1 + \frac{Mi}{x}] \qquad (8)$$

Note that this condition also satisfies equation (7).

The importance of this result is that it suggests that devaluation to improve competitiveness in the enclave sector will have no impact on the balance of foreign earnings of the sector in the short-run. In the long-run prices of intermediate inputs and final exports will diverge, but there will be some interdependence because of the international input output coefficient. To the extent that the input outport ratio remains largely unchanged overtime, because it reflects technological considerations, a devaluation will have little impact on net foreign earnings of the enclave sector even in the long-term. This suggests that the main utility of a devaluation is to reduce consumer imports and stimulate greater use of domestic inputs through its tendency to generally increase import prices. However, under normal conditions, the above aims can be achieved by a mix of tough monetary and fiscal policy including protection measures.

Finally, the importance of the equilibrium condition for enclave activity may be shown by considering that it is possible for this condition to hold without violating the Marshall-Lerner conditions. However, the latter will recommend devaluation when this occurs:

Proof: Given equation (8), we specify equation (4):

$$dB_x = d(B - M_i) = K[X\ (e_x - 1) + M_i\ e_i] = 0 \qquad (4)$$

and barring Giffen goods,

$$dB(m_c) > 0,\ d(m_d) > 0$$

we now rewrite the Marshall-Lerner condition of the balance of trade:

$$dB = dB(\ _x) - d(m_c) - d(m_d) - d(m_i) > 0 \qquad (2)$$

$$= K[X(e_x - 1) + M_i\ e_i + M_c\ e_c + M_d\ e_d] > 0 \qquad (3)$$

$$= K[X(e_x - 1) + M(e_m)] > 0 \qquad (2)$$

Some empirical evaluation of the application of the Marshall-Lerner condition has already been done for Jamaica by GAFAR [1981]. Gafar's approach was quite traditional but nevertheless includes data which can be used to test the predicitive power of equation (2) within the context of the Marshall-Lerner condition. Gafar's results for Jamaica in devaluation year 1967 are as follows:

$$e_x + ei^* \left[\frac{M_i^*}{X}\right] = -.63 - .67\ [.62] = -1.045 \qquad (8)$$

$$e_x + e_m^* \left[\frac{M}{X}\right] = -.63 - .56\ [1.14] = -1.27 \qquad (2)$$

Equation (8) is somewhat overstated because it was impossible to isolate intermediate inputs and capital goods used in export production from those for home use i.e.

$$e_i^* = \frac{m_i}{m_i + m_d}\ e_i + \frac{m_d}{m_i + m_d}\ e_d$$

$$m_i^* = m_i + m_d$$

Nevertheless the enclave elasticities converge to an equilibrium condition, but the Marshall-Lerner elasticities exceed (absolute) unity and recommend devaluation, as expected.

The fact that both the equilibrium condition [equation (8)] and the Marshall-Lerner ccondition [equation (2)] hold simulataneously is important. The former suggests that devaluation is not required because net export earnings will not increase. However, whenever this occurs the Marshall-Lerner condition will recommend devaluation, since it is an aggregate condition which does not distinguish between foreign earnings and foreign expenditure. The weakness of the Marshall-Lerner condition is that it recommends a fundamental change in prices across the board (i.e. a devaluation) which will impact largely on consumer imports. Such an action is usually considered sub-optimal when discretionary fiscal and monetary measures are available.

Conclusion

This paper highlights a fundamental weakness of the Marshall-Lerner condition, based as it is on aggregate demand elasticities, even if the assumptions on which it is based hold. A disaggregation of the Marshall-lerner condition suggests that a devaluation will largely impct by moderating foreign exchange expenditure while leaving net foreign exchange earnings virtually unchanged. The case for devaluation to improve export competitiveness and therefore net export earnings, is therefore weak. The goal of moderating foreign exchange expenditure is often better achieved by application of approxiate monetary and fiscal measures including selective protection.

One interesting point which has not been explored is that the formulae imply that an exchange rate change can do no harm to net export earnings. However, in this regard it must be realised that no attempt was made to account for the impact of a devaluation on the creation/extention of a black market. It is generally accepted that devaluation will increase the cost of foreign exchange while increasing foreign exchange hoarding. This effect may be approximated by a general lowering of the elasticities of demand. If in the export sector therefore, the elasticities are in equilibrium with zero change in the net export earnings, the black market effect will result in a loss of foreign exchange in this sector. This loss should be compared with any potential saving of foreign exchange expenditure (together with any distortion) to be had from an exchange rate change.

Bibliography

Butlin, M.W. Imported inputs in an Optimising Model of a Small Open Economy, Journal of International Economics, February 1985, p. 101.

Breuss, F. Robinson and Marshall-Lerner Conditions with Positive Import Content of Exports, European Economic Review, July 1984.

Browne, F.X. The International Transmission of Inflation to a Small Open Economy Under Fixed Exchange RAtes and Highly Interest Sensitive Capital Flows, European Economic Review, July 1984.

Gafar, J. Devaluation and the Balance of Payments Adjustment in a developing Economy: An Analysis Relating to Jamaica: 1954-72. Applied Economics 1981, 13, 151-165.

Feltenstein, A. Stabilisation of the Balance of Payments in a Small Planned Economy, with an Application to Ethiopia, J.D.E., May to June, 1985.

Witter, M. Exchange Rate Policy in Jamaica, Social and Economic Studies, December 1983.

Dornbush & Fisher Exchange Rates and the Current Account, AER 1980, 70, p. 960-971.

Obstfeld, M. 1980 Intermediate Imports, the Terms of Trade and the Dynamics of the Exchange Rate and the Current Account. Journal of International Economics 10. p. 461-480.

Sodersten, B. International Economics 1982 Edition Macmillian Press Ltd.