International Trade and Public Policy Students

Attached is an alternative derivation of the Marshall-Lerner condition, as found in Appleyard and Field's 4th edition of International Economics.

It is, in general, the same strategy as found in Salvatore. However, A&F explicitly add in a nominal exchange rate ($/pounds, if home is the US, so that an increase in a depreciation of the dollar) term, to make the Px alternatively expressed in foreign currencies terms as needed later. This is far more transparent than the trick/language that Salvatore uses to express this.

Also, note that A&F derive the (trade balance) condition all in terms of the **home country's currency**, rather than in foreign currency, as in Salvatore. Both ways are valid, of course.

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8. It has been argued that the appreciation of the yen against the dollar in the early 1990s did not have the anticipated effect on U.S. imports from Japan partly because the extent of pass-through was reduced by Japanese exporters during this period. Briefly explain what is meant by "pass-through" and how Japanese exporters would have been behaving if the allegation in the previous sentence were true.

Appendix DERIVATION OF THE MARSHALL-LERNER CONDITION

The requirements for stability in the foreign exchange market were discussed in the chapter, accompanied by a brief intuitive explanation. A more formal derivation of this important condition follows.

Given the following definitions:

P_x, P_m = domestic prices of exports and imports, respectively

Q_x, Q_m = quantities of exports and imports, respectively

V_x, V_m = value of exports and imports, respectively

the domestic trade balance, B, is defined as

$$B = V_x - V_m = Q_xP_x - Q_mP_m \quad [1]$$

and the change in the trade balance, dB, is defined as

$$dB = P_xdQ_x + Q_xdP_x - P_mdQ_m - Q_mdP_m \quad [2]$$

Assuming that the supply prices of traded goods and services do not change, that is, the supply curves are perfectly elastic over the range of quantity change, then the change in the prices of traded goods and services is attributable only to changes in the exchange rate. Since we are viewing the trade balance in terms of domestic currency in this example, dP_x is therefore equal to 0, whereas P_m changes by the percentage increase in the exchange rate, k. Therefore, dP_m is equal to kP_m. [If the exchange rate increases (the domestic currency depreciates) by 10 percent, the domestic price of imports increases by 10 percent.] We utilize the following definitions of export and import demand elasticity:

$$\eta_x = (dQ_x/Q_x)/[d(P_x/e)/(P_x/e)] \quad [3]$$

$$\eta_m = (dQ_m/Q_m)/(dP_m/P_m) \quad [4]$$

where P_x/e is the price of domestic exports in foreign currency. Turning to equation [3], the elasticity definition is reworked to obtain an expression for dQ_x in terms of η_x:

$$\begin{aligned}\eta_x &= (dQ_x/Q_x)/[(edP_x - P_xde)/e^2]/(P_x/e)] \\ &= [(dQ_x/Q_x)(P_x/e)]/[(edP_x - P_xde)/e^2] \\ &= (dQ_x/Q_x)/[(dP_x/P_x) - de/e]\end{aligned}$$

Since dP_x/P_x is assumed to be 0, then

$$\eta_x = (dQ_x/Q_x)/(-de/e)$$

thus,

$$\eta_x = (dQ_x/Q_x)/(-k)$$

and

$$\eta_x(-k)Q_x = dQ_x \quad [5]$$

Using equation [4], one can rewrite dQ_m in terms of the import demand elasticity η_m, that is,

$$(\eta_mQ_mdP_m)/P_m = \eta_mQ_mk = dQ_m \quad [6]$$

For a depreciation to improve the trade balance, the increase in the value of exports must exceed any increase in the value of imports. If demand for imports is elastic, that is no problem, since the value of total imports falls with the increase in price of foreign goods and services. If, however, demand for imports is inelastic, then depreciation of the currency leads to an increased expenditure for imports. We now return to equation [2] and rewrite it in terms of the two demand elasticities using [5] and [6], taking note that if depreciation is to improve the balance, $dB > 0$:

$$dB = P_x\eta_x(-k)Q_x - P_m\eta_m kQ_m - Q_m kP_m > 0$$

or

$$P_x\eta_x kQ_x + P_m\eta_m kQ_m + Q_m kP_m < 0$$

thus,

$$P_x\eta_x Q_x + P_m\eta_m Q_m < -Q_m P_m$$

and

$$\eta_x(P_xQ_x/P_mQ_m) + \eta_m < -1 \qquad [7]$$

or, stating the elasticities in absolute value terms,

$$|\eta_x|(P_xQ_x/P_mQ_m) + |\eta_m| > 1 \qquad [8]$$

The expressions in [7] and [8] constitute the Marshall-Lerner condition. In the case of balanced trade, $P_xQ_x/P_mQ_m = 1$, and thus the sum of the absolute values of the two elasticities must be greater than 1 if depreciation is to improve the balance. This is the basic Marshall-Lerner condition. When trade is not balanced, the condition is modified as indicated in [7] and [8] when the value of trade is measured in domestic currency.