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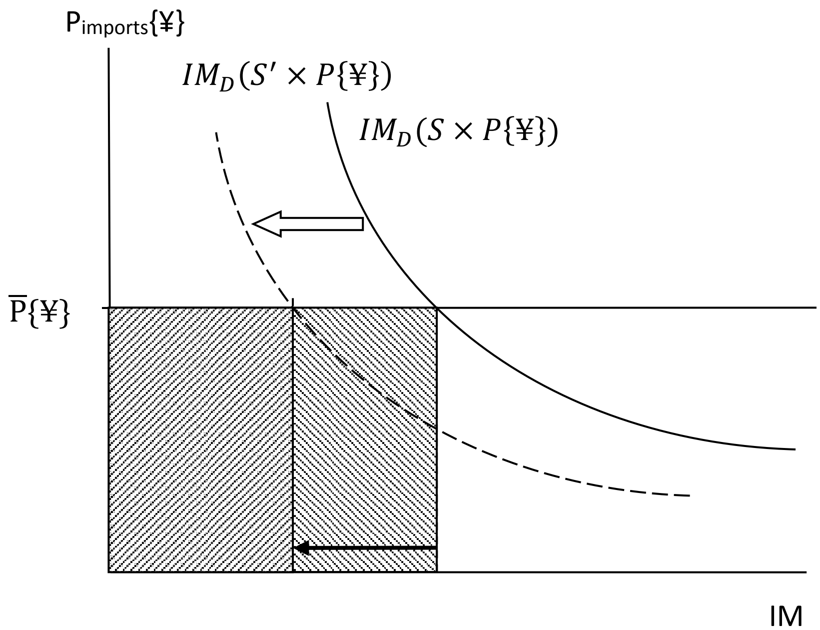
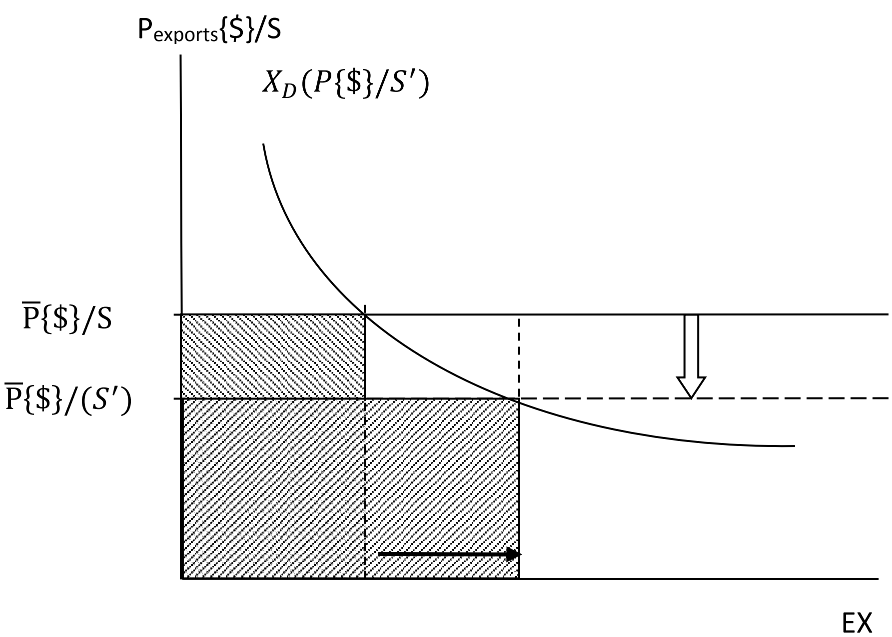
Devaluation and the Elasticities Approach

What is the impact of a devaluation ($S' > S$) on trade flows? We can do a partial equilibrium analysis, assuming income is held constant (so there is no change in imports due to changes in income), and prices are constant in home currency terms. First let's look at imports.



The export market is shown below:



The Marshall-Lerner Conditions

Let the US be the home country, and the foreign country be Japan. The US trade balance, $TB\{¥\}$, *in units of foreign currency*, e.g., yen (¥), is given by:

$$TB\{¥\} = \left(\frac{\bar{P}}{S}\right) \times EX - \bar{P}^{*}\{¥\} \times IM$$

Where, *EX* and *IM* are measured in Japanese widgets, and * denotes foreign country. Overbars indicate fixed values. Multiply both sides by S (measured in $/¥) and divide by P, to obtain:

$$(S \times TB\{¥\}/\bar{P}) = \frac{TB}{P} = EX - \left(\frac{S\bar{P}^{*}}{P}\right) \times IM$$

TB is the trade balance in nominal domestic currency terms; TB/P is the trade balance denominated in US widgets. Define the trade balance ($\widetilde{TB}$) in domestic widget terms as the difference between exports (EX) denominated in US widgets and imports (IM') denominated in US widgets:

$$\frac{TB}{\bar{P}} \equiv \widetilde{TB} = EX - IM'$$

However, imports are the foreign (*) country's exports, so:

$$IM' = \left(\frac{S\bar{P}^{*}}{\bar{P}}\right) \times EX^{*} \equiv qEX^{*}$$

where q is a real exchange rate, measured in terms of number of home widgets needed to purchase one foreign widget. Then the trade balance is functionally defined as:

$$\widetilde{TB} = EX - qEX^{*}$$

(As in the textbook, we take the income levels as exogenously fixed.) To determine the response of the trade balance to a change in the real exchange rate, take the partials with respect to the real exchange rate:

$$\frac{\partial \widetilde{TB}}{\partial q} = \frac{\partial EX}{\partial q} - \left(q\frac{\partial EX^{*}}{\partial q} + EX^{*}\right)$$

$$\frac{\partial \widetilde{TB}}{\partial q} = \left(\frac{\partial EX}{\partial q} - q\frac{\partial EX^{*}}{\partial q}\right) - EX^{*}$$

$$\frac{\partial \widetilde{TB}}{\partial q} = (volume \quad effect) + (value \quad effect)$$

One wants to know if $\partial \widetilde{TB} / \partial q$ is greater than or less than zero. Solve for:

$$0 < \frac{\partial EX}{\partial q} - q\frac{\partial EX^*}{\partial q} - EX^*$$

Multiply both sides by the quantity (*q/EX*) to obtain:

$$0 < \frac{\partial EX}{\partial q}\frac{q}{EX} - q\frac{\partial EX^*}{\partial q}\frac{q}{EX} - EX^*\frac{q}{EX}$$

Define the first term as ε_{EX}, the export demand elasticity. Further note that *if initial trade is balanced*, then $EX = qEX^*$ such that $q/EX = 1/EX^*$.

$$0 < \varepsilon_{EX} - \frac{\partial EX^*}{\partial q}\frac{q}{EX^*} - 1$$

Finally, define the import demand elasticity:

$$-\frac{\partial EX^*}{\partial q}\frac{q}{EX^*} \equiv \varepsilon_{IM}$$

then one obtains the Marshall-Lerner-Robinson condition:

$$1 < \varepsilon_{IM} + \varepsilon_{EX}$$

which is appropriate for export supply and import supply elasticities that are infinite.

Caveats:

1. What if export supply and import supply elasticities are not infinite?
2. What if initial trade is not balanced?
3. Recall, prices of exports are fixed in domestic currency terms; prices of the foreign country's exports are fixed in foreign currency terms.

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