International Equilibrium and the Terms of Trade

- **Terms of trade** (TOT) is the price of exports relative to the price of imports.

- ***TOT improves*** for the Home country (and worsens for the Foreign country) when the world relative price of Home export good rises.

- International equilibrium can be described by *either* of the following world-market clearing conditions:

$$X = M^*$$

$$M = X^*$$

Alternative representation in terms of trade balance conditions:

- International trade should be balanced for each country for trade volumes satisfying national budget constraint.

- Equilibrium TOT should alternatively be such that trade is balanced for both countries in our two-country world.
- Let p^w is the relative price of computer in terms of textile.

$$p_e^w \, M = X$$

$$p_e^w X^* = M^*$$

$$p_e^w \, \mathrm{M} = M^*$$

Offer Curve of the Home Country

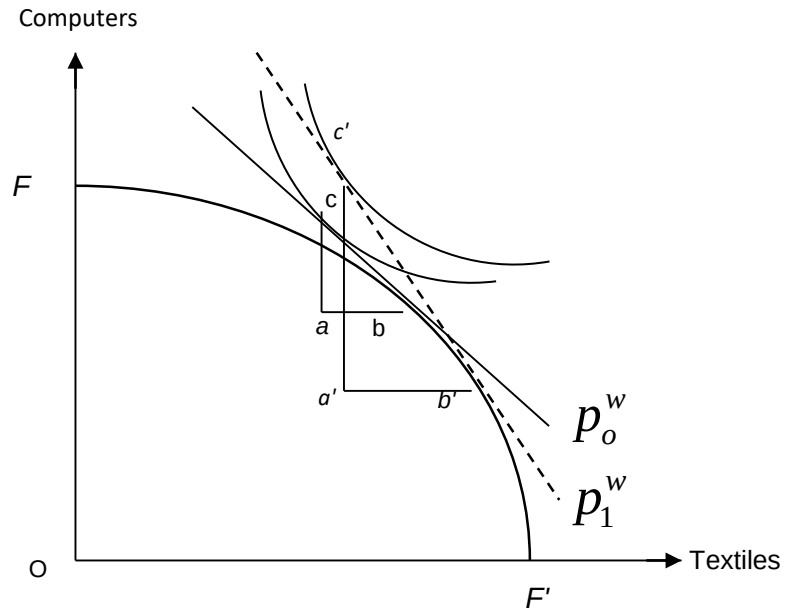


Figure 1: Export Offer and Import

Demand by the Home Country

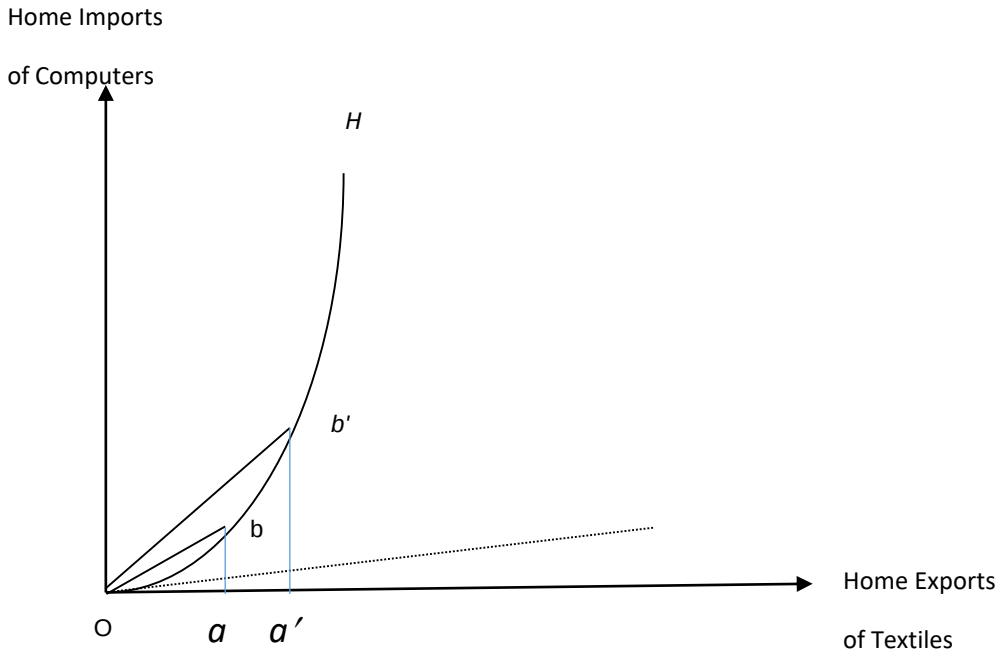


Figure 2: Home Offer Curve

It is the locus of pairs of export offer and import demand at different TOT that maintains balanced trade.

By construction, at any point on the offer curve, trade is balanced for the Home country.
Thus, the Home offer curve is essentially a locus of its trade balance condition.

Slope and Shape of the Home Offer curve

- The slope of the Home country's offer curve *OH* at the origin is the autarchic relative price of textiles.

- The slope of the ray connecting any point along the offer curve *OH* and the origin gives us the corresponding post-trade relative price or the TOT.

- The upward slope of the offer curve *OH* reflects that a larger volume of import demand requires a larger export offer by the Home country to finance it.

It is *convex* downwards because:

First, a larger volume of exports is offered only at a higher relative price of exports, i.e., only when the TOT improves.

Second, successively smaller additional units of exports are sufficient to finance successively larger additional units of import demand.

$\hat{p}^w + \hat{M} = \hat{X}$ Now TOT improvement means $\hat{p}^w < 0$

$$\hat{p}^w = \frac{dp^w}{p^w}$$

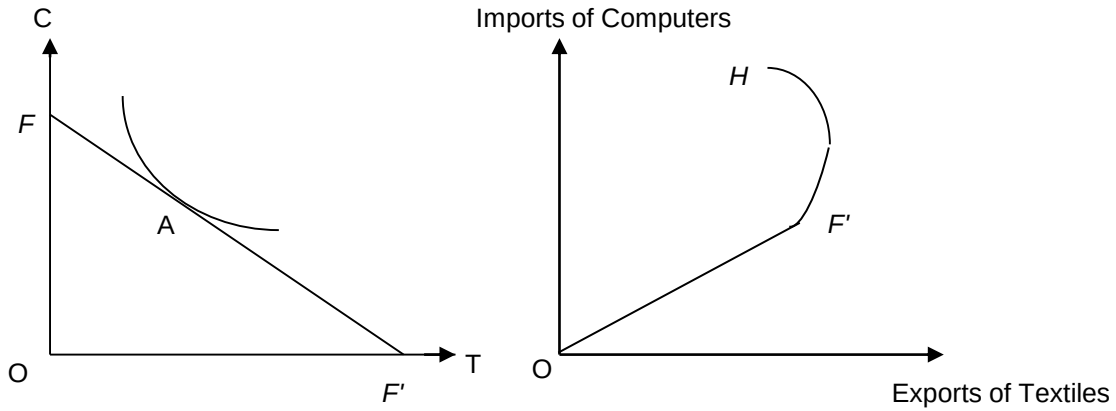


Figure 3: Offer Curve under Constant Opportunity Cost

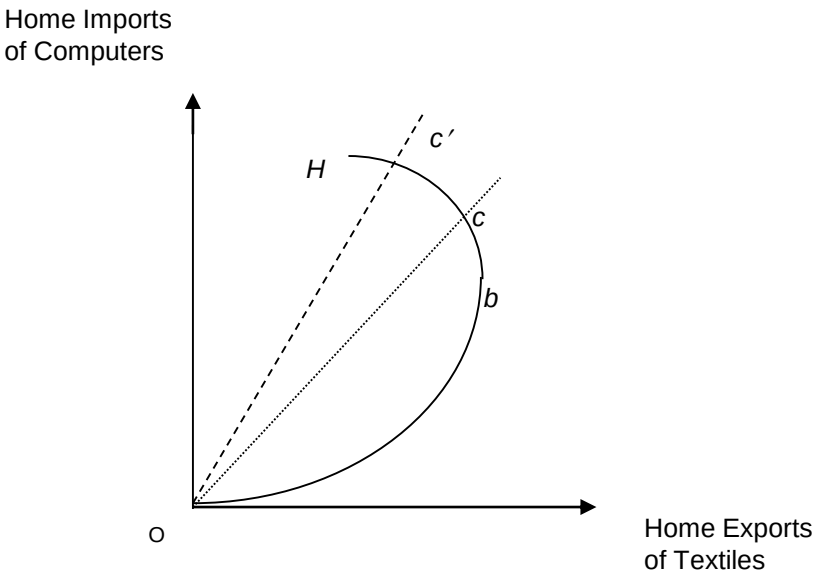


Figure 4: Backward Bending Home Offer Curve

Geometric measurement of the import demand elasticity along offer curve

$$\varepsilon \equiv -\frac{\hat{M}}{\hat{P}^w}$$

Price elasticity of import demand is the percentage change in import demand for a good for one percent change in its (relative) price in the world market.

From the trade balance condition

$$\hat{X} = \hat{M} + \hat{P}^w$$

$$\varepsilon = -\frac{\hat{M}}{\hat{X} - \hat{M}} = \frac{1}{1 - \frac{dX}{dM}\frac{M}{X}}$$

$$\varepsilon = \frac{1}{1 - \frac{ST}{RT}.\frac{RT}{OT}} = \frac{OT}{OS}$$

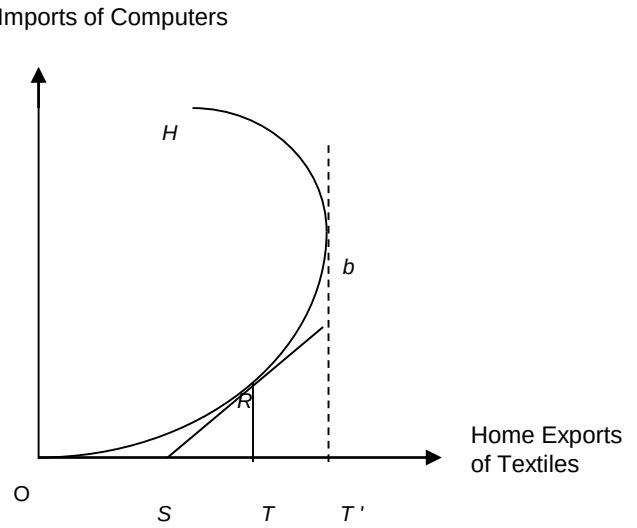


Figure 5: Backward Bending Home Offer Curve

Foreign Offer Curve and the International Equilibrium

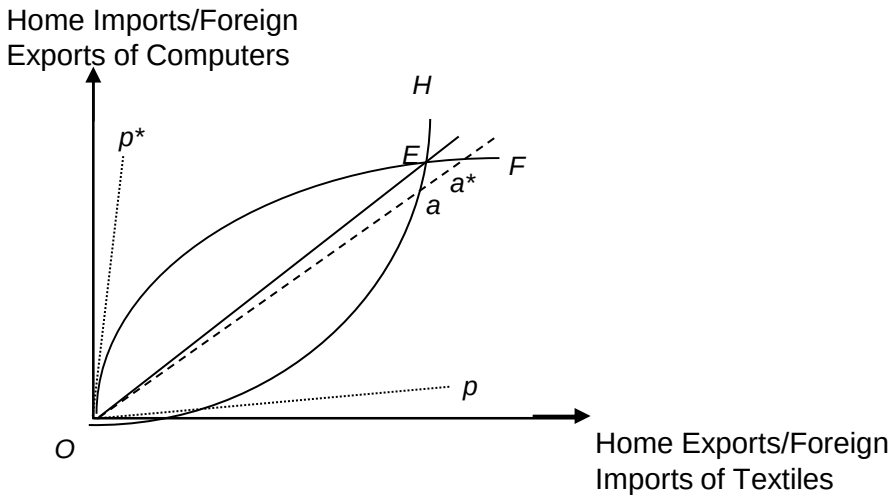


Figure 6: Equilibrium TOT

Existence, Uniqueness and Stability of International Equilibrium

Condition for Existence of (Walrasian) equilibrium:

The world price $P_e \geq 0$ exists if the following conditions hold:

i) E(P) is continuous in p (SC, not NC);

ii) $\exists a P_0 > 0 \ni E(P_0) > 0$

iii) $\exists a P_1 > 0 \ni E(P_1) < 0$

Stability of International Equilibrium

Define excess demand function

$E(p^w) = M(p^w) - X^*(p^w)$

An equilibrium is ***Walrasian stable*** if any deviation of the price from the equilibrium value creates a state of excess demand that would in turn induce competitive forces to cause the price return to the initial equilibrium value. That is, $\frac{dE(p^w)}{dp^w} < 0$

$$\frac{dM/M}{dp^w/p^w} < \frac{d(M^*/p^w)/(M^*/p^w)}{dp^w/p^w}$$

$$\frac{\hat{M}}{\hat{p}^w} < \frac{\hat{M}^* - \hat{p}^w}{\hat{p}^w} = \frac{\hat{M}^*}{\hat{p}^w} - 1$$

$$\Rightarrow \quad -\varepsilon < \varepsilon^* - 1 \quad \Rightarrow \quad \varepsilon + \varepsilon^* > 1$$

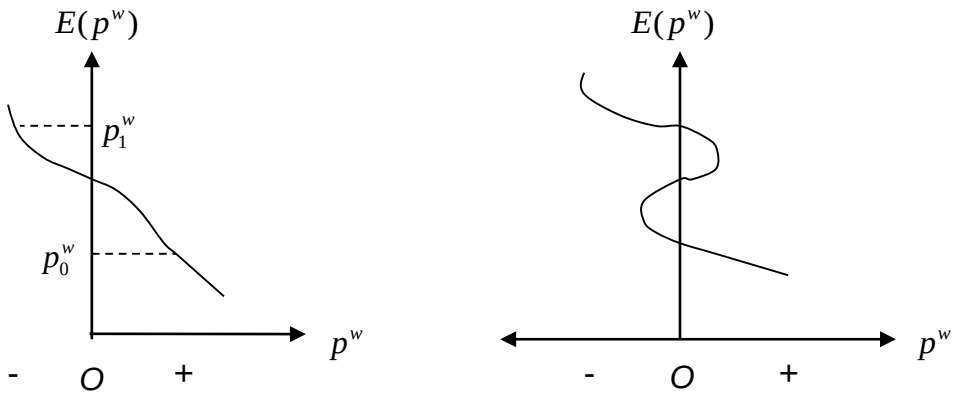


Figure 7: Unique and Multiple Equilibria

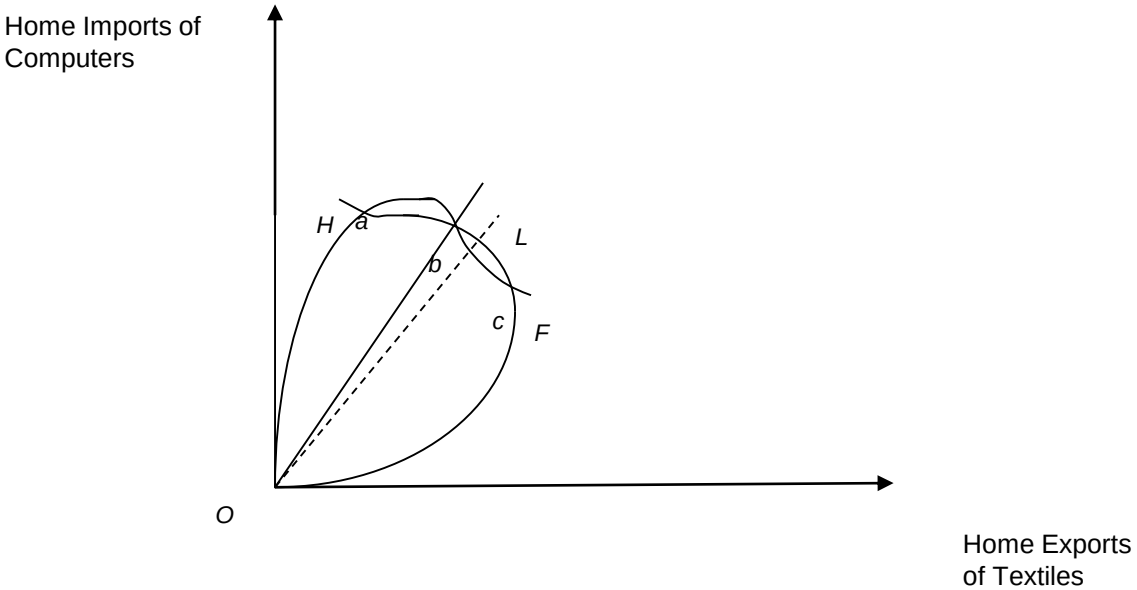


Figure 8: Multiple Equilibria and Instability

Implication of the Marshall-Lerner condition

- **Nominal Devaluation improves the trade balance only if the Marshall-Lerner or the elasticity condition is satisfied**

$$\$B = (P/e).M^* - P^*M$$

- **A devaluation (raising the pegged rate) raises $B if**

$$\varepsilon + \varepsilon^* > 1$$

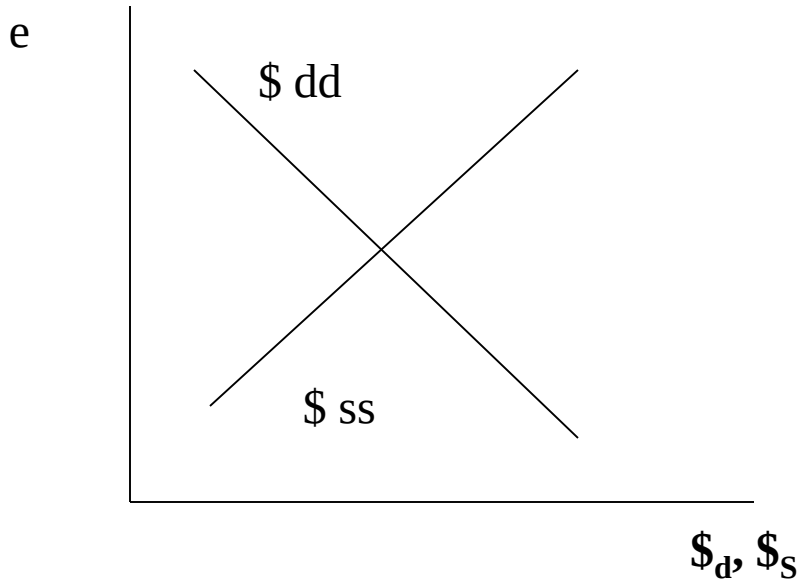
- **Note, if $S curve is upward sloping, this condition is satisfied and hence devaluation improves trade balance**

- **Dollar Demand**

$$\$_d = P^*M(eP^*/P)$$

- **Dollar Supply**

$$\$_S = (P/e).M^*(eP^*/P)$$



M = volume of import demand

M* = volume of foreigners' import demand

P = Rupee-price of home goods

P* = Dollar-price of foreign goods

p = eP*/P = relative price of foreign goods

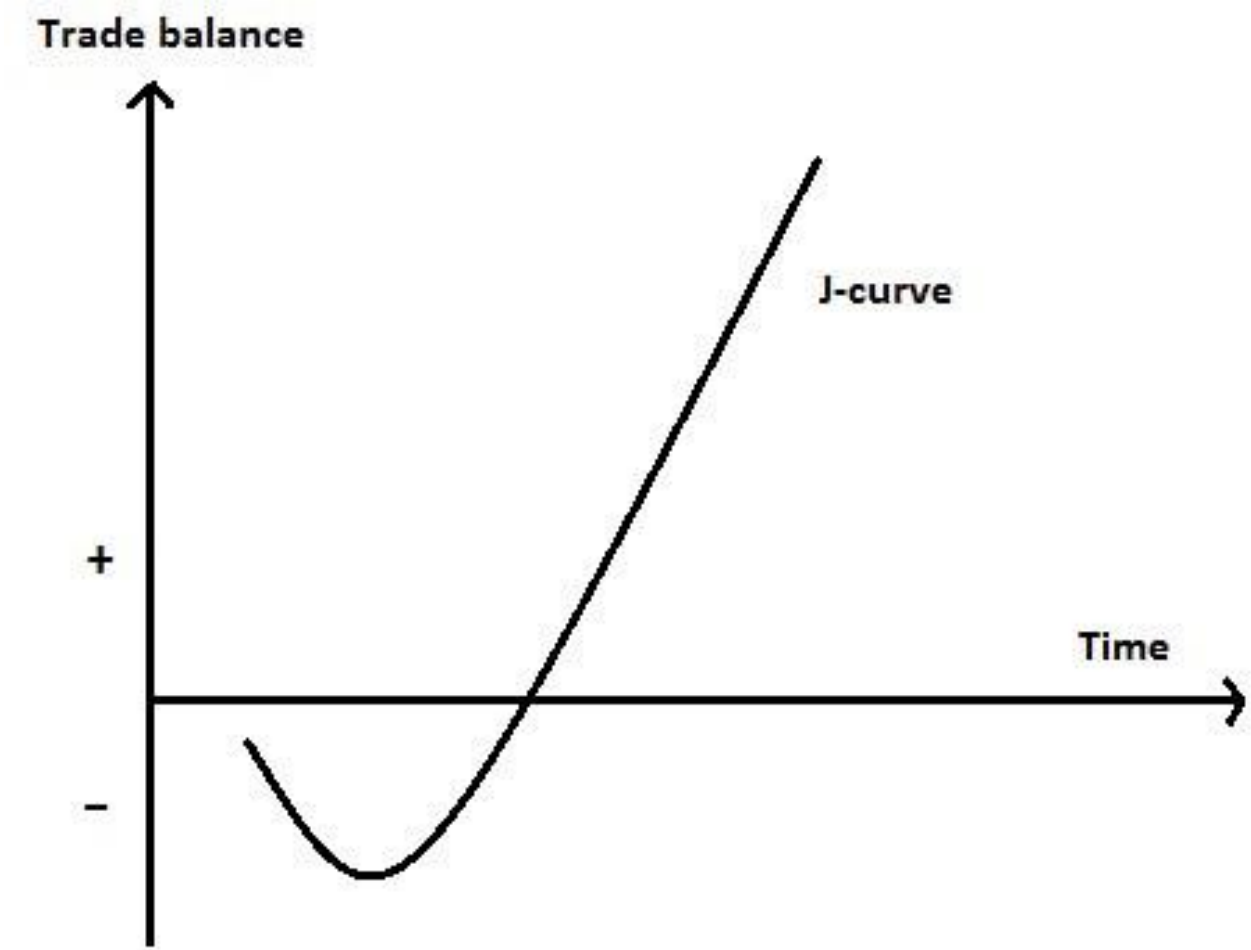
Stability: Marshall-Lerner

$$\varepsilon + \varepsilon^* > 1$$

J-Curve Phenomenon

- **But it has been observed that with high trade deficits, immediately after the devaluation, elasticity values are quite low so that deficit grows further**

- **With the passage of time, elasticity values rise, and trade balance improves**


Trade balance
J-curve
+
Time
–