# **Open Economy Macroeconomics**

## Unit 2

#### Elasticity Approach to the Balance of Payments

- Aim: There is an important question we have to answer:

– Does a devaluation always improve the current account?

To answer this question we are going to:

<u>1.- Deal with main identities for an open economy</u>

2.- Study the elasticity approach

#### **Some open economy identities**

- In an open economy, GDP differs from that of a closed economy because.

- There is an additional injection: export expenditure
- There is also an additional leakage: import expenditure
- Thus, the identity for an open economy is:

 $\Box Y = C + I + G + X - M$ 

If we deduct taxation T from the both sides of the equation

 $\Box Yd = C + I + G + X - M - T$ 

And, if we consider private savings (S = Yd - C), we can rearrange eq. so

$$\Box (X - M) = (S - I) + (T - G)$$

#### **Open economy multipliers**

$$\Box Y = C + I + G + X - M$$

- $\Box$  C = Ca + cY
- $\Box$  S = Sa + sY (we assume T = 0)
- $\Box$  M = Ma + mY
- $\Box$  I = Ia = I
- $\Box$  G = Ga = G
- $\Box X = Xa = X$
- □ If we substitute all these equations in the first identity:

#### **Open economy multipliers**

$$\Box Y = Ca + cY + I + G + X - Ma - mY$$

Therefore:

$$\Box$$
 (1 - c + m)Y = Ca + I + G + X - Ma

As 
$$T = 0$$
,  $(1 - c) = s$ 

$$\Box Y = \frac{1}{s+m} (Ca + I + G + X - Ma)$$

This equation can be transformed into difference form to yield:

$$\Box dY = \frac{1}{s+m} (dCa + dI + dG + dX - dMa)$$

### **Open economy multipliers (Y)**

- The government expenditure multiplier

$$\frac{dY}{dG} = \frac{1}{s+m} > 0$$

- The export multiplier

$$\frac{dY}{dX} = \frac{1}{s+m} > 0$$

- The import multiplier

$$\frac{dY}{dM} = -\frac{1}{s+m} < 0$$

#### **Open economy multipliers (Y)**



 $\Box S + M = I + G + X$ 



#### **Open economy multipliers (X - M)**

$$\Box Y = \frac{1}{s+m} (Ca + I + G + X - Ma)$$

 $\Box$  (s + m)Y - (Ca + I + G + X - Ma) = 0

$$\Box mY - \frac{m}{s+m} (Ca + I + G + X - Ma) = 0$$

$$\Box mY - \frac{m}{s+m} (Ca + I + G + X - Ma) + X + Ma = X + Ma$$

$$\Box X - M = X - Ma - \frac{m}{s+m} (Ca - Ma + I + G + X)$$

$$\Box dCA = dX - dMa - \frac{m}{s+m} (dCa - dMa + dI + dG + dX)$$

### **Open economy multipliers (X - M)**

- The government expenditure multiplier

$$\frac{dCA}{dG} = -\frac{m}{s+m} < 0$$

- The investment multiplier

$$\frac{dCA}{dI} = -\frac{m}{s+m} < 0$$

- The export multiplier

$$\frac{dCA}{dX} = \frac{s}{s+m} > 0$$

### **Elasticity approach**

- Aim: Investigate the impact of exchange rate changes on the current account.

- Exchange rate: direct quotation
- Current account. For simplicity we make it equal to the trade account

#### - Assumptions

- 1.- The supply elasticities for the domestic export good and the foreign import good are, with respect to the exchange rate, infinite
  This means that changes in demand have no effects on prices
  This also means that P and P\* are fixed
- 2.- Domestic income is constant
- The equations of the model

$$CA = P X_v - S P^* M_v$$
$$CA = X - S M$$

$$dCA = dX - S \, dM - M \, dS$$

$$\frac{dCA}{dS} = \frac{dX}{dS} - S\frac{dM}{dS} - M\frac{dS}{dS}$$

At this point we introduce two definitions:



Then, substituting we have:

$$\frac{dCA}{dS} = \frac{\eta_X X}{S} + (\eta_M M) - M$$

And assuming that initially we have balance trade (X=SM):

$$\frac{dCA}{dS} = \mathcal{M}(\eta_X + \eta_M - 1)$$

This giving us the Marshall-Lerner condition:

*Marshall – Lerner* condition 
$$\eta_x + \eta_m > 1$$

What if initially the CA is not in equilibrium? In this case, X= $\theta$ SM, being  $\theta$  higher or lower than 1, so

$$\frac{dCA}{dS} = M(\theta \eta_X + \eta_M - 1)$$

The Marshall-Lerner condition becomes:

 $\theta \eta_X + \eta_M > 1$ 

Whatever the condition, it is clear there are two direct effects of a devaluation on the current account:

- The price effect, which contributes to worsening the current account
- The volume effect, which contributes to improving the current account

The Marshall Lerner condition assesses what effect is higher and, therefore, if the devaluation improves or not the current account.

#### Example. Devaluation and the current account

|   | Volume | Price | Euro  | Dollar  |
|---|--------|-------|-------|---------|
|   |        |       | Value | Value   |
| Initial Exchange rate: 0.5€=1\$                               |        |       |       |         |
| EU exports  | 100    | €1    | €100  | \$200   |
| EU Imports  | 40     | \$5   | €100  | \$200   |
| Current balance   |        |       | €0    | \$0     |
| Devaluation domestic currency: New Exchange rate: 0.66€ = 1\$ |        |       |       |         |
| EU exports  | 105    | €1    | €105  | \$157.5 |
| EU Imports  | 36     | \$5   | €120  | \$180   |
| Current balance   |        |       | -€15  | -\$22.5 |
| Devaluation domestic currency: New Exchange rate: 0.66€ = 1\$ |        |       |       |         |
| EU exports  | 130    | €1    | €130  | \$195   |
| EU Imports  | 30     | \$5   | €100  | \$150   |
| Current balance   |        |       | €30   | \$45    |

What does the empirical evidence tell us about  $\eta_x$  and  $\eta_m$ ?

Empirical evidence is not conclusive. Elasticity optimists and elasticity pessimists

- 1.- Industrialised countries versus developing countries
- 2.- Short-run versus long-run (J-curve effect)

