The Global Economy II

Nova SBE – Spring 2023

Miguel Lebre de Freitas, Diogo Lima, Pedro Sousa Coelho

Resit 16/06/2023 – Duration: 1h45

I (4.5)

*Define **<u>three</u>** of the following concepts (3-5 lines each):*

i. GNDI

ii. Trading risk

iii. Overshooting

iv. Exchange rate pass through

v. Peso problem

IV (2)

In each question, choose one (correct answer: +0.5; wrong answer: -0.125):

a. In a 2-period open economy, a temporary output contraction causes: (i) a fall in private consumption; (ii) an improvement in the current account; (iii) a fall in private investment; (iv) all the above.

b. The relative PPP will fail in the long run in the presence of: (i) transportation costs; (ii) sticky prices; (iii) permanent fiscal changes; (iv) none of the above.

c. Deviations from uncovered interest rate parity can be explained by: (i) differences between income taxes and taxes on capital gains; (ii) risk aversion; (iii) barriers to capital mobility; (iv) all the above.

d. Joining a currency area from below the OCA line will be less likely to be self-validating if, all else equal: (i) the country specializes according to comparative advantages; (ii) trade becomes more intra-industry; (iii) labor mobility increases; (iv) none of the above.

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II (13.5)

Unless otherwise stated, please present the results with, at most, 2 decimal places.

II.A. Consider an economy with flexible prices under **fixed** exchange rate, where money demand is given by: $m^D = Y/10i$, being i is the nominal interest rate. The foreign price level is $P^* = 2$, the real interest rate is 25% , both the Fisher principle and PPP hold each moment in time, and full employment output is always reached at $Y^f = 100$. Initially, the money supply is constant and equal to $M = 40$, and the initial CB holdings of foreign reserves are $eB_C^* = 24$.

a) Quantify the initial values for:

(a1) the real money demand

$m^D = \frac{Y}{10i} = \frac{100}{10 \cdot 0{,}25} = 40$

Note: e is fixed $\Rightarrow \bar{e}P^* = P$ [P is fixed as P^* is exogenous] $\Rightarrow \pi = 0\% \Rightarrow i = r = 25\%$

(a2) the price level

$\frac{M}{P} = m^D \Leftrightarrow \frac{40}{P} = 40 \Leftrightarrow P = 1$

(a3) the exchange rate

By PPP, $eP^* = P \Leftrightarrow e = \frac{P}{P^*} \Leftrightarrow e = \frac{1}{2}$

The peg is set at $\bar{e} = 1/2$

(a4) the velocity of money

By the Equation of Exchange, $MV = PY \Leftrightarrow 40V = 100 \cdot 1 \Leftrightarrow V = \frac{100}{40} \Leftrightarrow V = 2{,}5$

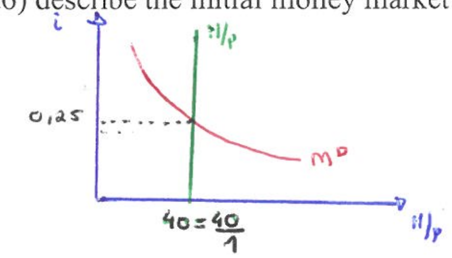
(a5) the central bank's balance sheet

$M = eB^*_{CB} + B_{CB} \Leftrightarrow 40 = 24 + B_{CB} \Leftrightarrow B_{CB} = 16$

Then,

A	L
$eB^*_{CB} = 24$	$M = 40$
$B_{CB} = 16$	

(a6) describe the initial money market equilibrium in a graph



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b) Now suppose that there was a **one-time** productivity surge in our economy, which led to: $Y' = 125$. Assuming that the **central bank keeps the peg**:

(b1) compute the real money demand;

$$m^D = \frac{y}{10i} = \frac{125}{10 \cdot 0{,}25} = 50 \ (?)$$

no change in i [follows the same reasoning as in a1]

(b2) find the money supply;

$$\frac{M}{P} = m^D \Leftrightarrow \frac{M}{1} = 50 \Leftrightarrow M = 50 \ (?)$$

Note: if the CB keeps the peg ($\bar{e}$) and P^* are exogenous, P cannot change (still equal to 1)

(b3) draw the central bank's balance sheet, explaining how the central bank intervenes.

↳ the CB adjusts M to keep the peg. This adjustment is fully done with eB^*_{CB}, as there is no indication that the domestic agents demand more credit.

↳ $\Delta M = \Delta eB^*_{CB} \Leftrightarrow \Delta eB^*_{CB} = 50 - 40 = 10$

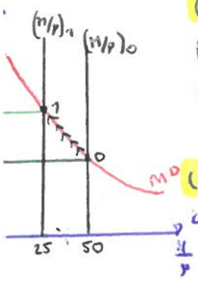
↳ new $eB^*_{CB} = 24 + 10 = 34$

↳ $\Delta B_{CB} = 0 \Rightarrow B_{CB} = 16$

A	L
$eB^*_{CB} = 34$	$M = 50$
$B_{CB} = 16$	

c) Departing from b), assume that unexpectedly the central bank decided to increase domestic bonds by 25% each year to finance reoccurring government deficits, while **keeping the peg**. Considering that investors are rational and have perfect foresight, describe and quantify:

(c1) The money market equilibrium when the central bank announces the policy and after the attack



(1) upon announcement

↳ the peg is still kept $\Rightarrow \bar{E} \Rightarrow \bar{P} \Rightarrow \pi = 0\% \Rightarrow i = 25\% \Rightarrow m^D = 50$ (equal to b_1)

↳ Then, as $P = 1$, $M = 50$. M is fixed (to keep the peg, the increase in B_{CB} will be offset by a decrease in eB^*_{CB} → sterilization)

(2) after the attack

↳ The attack occurs when the price (and the exchange rate) after it are equal to the pre-attack values, meaning that $P = 1$ still. But the peg breaks and forex collapses to 0, meaning that $M = B_{CB}$.

(c2) The central bank balance sheet immediately after the attack

↳ After the attack there are no more foreign reserves.

↳ Then, $M = B_{CB} = 25$

A	L
$eB^*_{CB} = 0$	$M = 25$
$B_{CB} = 25$	

↳ $M_{gr} = B_{CB\,gr} = 25\%$

↳ $\pi = \mu = 25\%$

↳ $i = r + \pi = 25\% + 25\% = 50\%$

↳ $m^D = \frac{y}{10i} = \frac{125}{10 \cdot 0{,}5} = 25$

↳ $\frac{M}{P} = m^D \Leftrightarrow M = P \cdot m^D \Leftrightarrow M = 25$

(c3) The timing of the regime change. Explain the intuition.

Note: There were other ways to solve this exercise that also received full mark

↳ The attack will occur when agents make no capital gains / losses with it, which implies that $\Delta P = \Delta e = 0$

t = 0

$B_{CB} = 16$

$eB^*_{CB} = 34$

$M = 50$

If we attack:

→ $M = B_{CB} = 16$

→ $\frac{M}{P} = m^D \Leftrightarrow \frac{16}{P} = 25 \Leftrightarrow P = 0{,}64$

→ $P\downarrow \Rightarrow$ too early to attack

t = 1

$B_{CB} = 16 \cdot 1{,}25 = 20$

$eB^*_{CB} = 34 - \Delta B_{CB} = 30$

$M = 50$

If we attack:

→ $M = B_{CB} = 20$

→ $\frac{M}{P} = m^D \Leftrightarrow \frac{20}{P} = 25 \Leftrightarrow P = 0{,}8$

→ $P\downarrow \Rightarrow$ too early to attack

t = 2

$B_{CB} = 20 \cdot 1{,}25 = 25$

$eB^*_{CB} = 30 - \Delta B_{CB} = 25$

$M = 50$

If we attack:

→ $M = B_{CB} = 25$

→ $\frac{M}{P} = m^D \Leftrightarrow \frac{25}{P} = 25 \Leftrightarrow P = 1$

→ $\Delta P = 0 \Rightarrow$ optimal to attack

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II.B. Consider an open economy with **sticky** prices under **flexible** exchange rates. In this economy, money supply is equal to $M = 25$, money demand is given by $m^D = \frac{Y}{20i}$, and full employment output is $Y_f = 100$. The interest rate parity holds instantaneously, the foreign interest rate is equal to $i^* = 0.05$. The foreign price level is sticky and initially equal to the domestic price level at: $P = P^* = 1$. The goods market equilibrium is described by the expression: $Y = 4\,(\bar{A} + TB)$, where $\bar{A} = 30$, $TB = \bar{X} + 5(\theta - 1)$, $\bar{X} = -5$ and $\theta = \frac{eP^*}{P}$.

d) Regarding this initial setting, and assuming that no further changes in the exogenous variables are anticipated:

(d1) Compute the expected exchange rate.

↳ The E(e) is the exchange rate when we are at the LR $[y = y_f = 100]$

DD

$y = 4(A + TB) \Leftrightarrow y = 4[30 - 5 + 5(\frac{eP^*}{P} - 1)] \Leftrightarrow y = 4[25 + 5\frac{e}{P} - 5] \Leftrightarrow y = 80 + 20\frac{e}{P}$

$y = 100 \Leftrightarrow 80 + 20\frac{e}{P} = 100 \Leftrightarrow 20\frac{e}{P} = 20 \Leftrightarrow e = P$ } valid for the LR

AA

· $\frac{M}{P} = m^D \Leftrightarrow \frac{M}{P} = \frac{y}{20i} \Leftrightarrow \frac{P}{M}\frac{y}{20} = i \Leftrightarrow \frac{P}{M}\frac{y}{20} = i^* - 1 + \frac{E(e)}{e}$

· LR ⇒ $\frac{e_{LR}}{25}\frac{100}{20} = 0{,}05 - 1 + 1 \Leftrightarrow \frac{5}{25}e_{LR} = 0{,}05 \Leftrightarrow e_{LR} = E(e) = 0{,}25$

(d2) Derive the AA and DD curves *[Consider that E(e) = 1 if you have not done d1]*.

DD

Following the reasoning in d_1, DD: $y = 80 + 20\frac{e}{P}$

Given that $P = 1$, $DD_0: y = 80 + 20e$

AA

Following the reasoning in d_1, $\frac{P}{M}\frac{y}{20} = i^* - 1 + \frac{E(e)}{e} \Leftrightarrow \frac{1}{25}\frac{y}{20} = -0{,}95 + \frac{1}{e} \Leftrightarrow$

$\Leftrightarrow \boxed{y = -475 + \frac{125}{e}}$ AA_0

Note

If E(e) was considered to be 1, $AA_0: y = -475 + \frac{500}{e}$

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(d3) Use AA and DD to compute the short-run equilibrium, namely the nominal exchange rate **(please include, at least, 3 decimal places)** and output.

[Tip: the quadratic formula is $x = \frac{-b+\sqrt{b^2-4ac}}{2a}$*]*

SR equilibrium : $AA_0 = DD_0 \Leftrightarrow$

$\Leftrightarrow -475 + \frac{125}{e} = 80 + 20e \Leftrightarrow$

$\Leftrightarrow -475e + 125 = 80e + 20e^2 \Leftrightarrow$

$\Leftrightarrow 20e^2 + 555e - 125 = 0 \Rightarrow$

$\Rightarrow e = 0,223 \ (e>0)$ $\quad$ [If $E(e) = 1$, $e = 0,873$]

Then, $y = 80 + 20 \cdot 0,223 = 84,87$

If $E(e) = 1$, $y = 97,46$

(d4) Find the trade balance.

$TB = \bar{X} + 5(\theta - 1) = -5 + 5\left(\frac{0,223 \cdot 1}{1} - 1\right) = -8,88$

If $E(e) = 1$, $y = -5,635$

(d5) Compute the long-run price level in the absence of policy interventions.

Following the reasoning in d1, DD : $y = 80 + 20\frac{e}{P}$

If we are at the LR, $y = 100 \wedge E(e) = e = 0,25$

Then, $100 = 80 + \frac{20 \cdot 0,25}{P_{LR}} \Leftrightarrow 20 = \frac{5}{P_{LR}} \Leftrightarrow P_{LR} = 1/4$

In the LR, prices will converge to $1/4$.

(d6) Derive the long-run AA & DD curves in the absence of policy interventions.

DD

In the LR, the DD curve will change due to the change in P

$y = 80 + 20\frac{e}{P}$ with $P = 0,25 \Rightarrow y = 80 + \frac{20}{0,25}e \Leftrightarrow \boxed{y = 80 + 80e}$ DD_{LR}

AA

$\frac{P}{M}\frac{y}{20} = i^* - 1 + \underbrace{\frac{E(e)}{e}}_{\substack{=1 \text{ as} \\ \text{we are} \\ \text{at the} \\ \text{LR}}} \Leftrightarrow \frac{0,25}{25}\frac{y}{20} = -0,95 + \frac{0,25}{e} \Leftrightarrow \boxed{y = -1900 + \frac{500}{e}}$ AA_{LR}

↳ The AA curve will change due to the new level of P.

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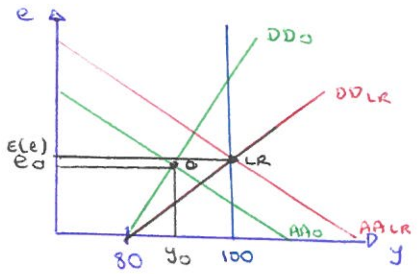
(d7) Describe, explaining in detail, the adjustment to the long-run referring to the AA-DD diagram.

$e_0 = 0{,}223$ or $0{,}873$

$y_0 = 84{,}87$ or $97{,}46$

$E(e) = 0{,}25$ or 1



e) Assume now that the government urged the central bank to **permanently** change the money supply in order to restore full employment:

(e1) Find the required level of the money supply and the new expected exchange rate.

↳ By the DD curve (and knowing that $\underbrace{y=100}$ and $\underbrace{P=1}$): $100 = 80 + 20e \Leftrightarrow \underbrace{e=1}$

The policy drives y to yF

prices don't adjust in the SR

The new E(e) is 1

↳ By the AA curve [with $y = 100$, $P = 1$ and $E(e) = 1$]:

$$\frac{P}{M}\frac{y}{20} = i^* - 1 + \underbrace{\frac{E(e)}{e}}_{=1} \Leftrightarrow \frac{1}{M}\frac{100}{20} = 0{,}05 \Leftrightarrow \frac{5}{M} = 0{,}05 \Leftrightarrow M = 100$$

(e2) Derive the AA & DD curves after the implementation of the policy.

Our goal is to find the SR AA and DD curves.

→ In the SR, there is no change in P ⇒ same DD curve ⇒ $\underbrace{y = 80 + 20e}_{DD}$

→ AA changes due to ΔM and $\Delta E(e)$:

$$\frac{1}{100}\frac{y}{20} = -0{,}95 + \frac{1}{e} \Leftrightarrow \frac{y}{2000} = -0{,}95 + \frac{1}{e} \Leftrightarrow \underbrace{y = -1900 + \frac{2000}{e}}_{AA}$$

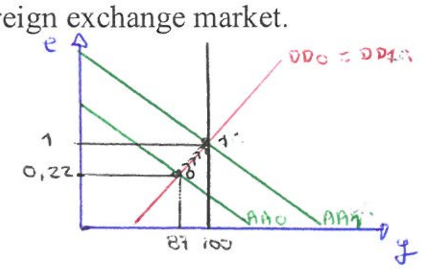
(e3) Describe, explaining in detail, the adjustment process, referring to the AA-DD diagram, the money market, and the foreign exchange market.

① AA – DD

$AA_0: y = -475 + \frac{125}{e}$

$DD_0: y = 80 + 20e = DD_1$

$AA_1: y = -1900 + \frac{2000}{e}$



② Asset Approach

$$i_0 = i^* + \frac{E(e)_0}{e_0} - 1 = 0{,}05 + \frac{0{,}25}{0{,}223} - 1 = 0{,}18$$

$$i_1 = i^* + \frac{E(e)_1}{e_1} - 1 = 0{,}05 + 1 - 1 = 0{,}05$$

Then, i goes down