NOVA

Number: **Name:**

The Global Economy II

Nova SBE – Fall 2023

Miguel Lebre de Freitas, Diogo Lima, Pedro Sousa Coelho

Exam 09/12/2023 – Duration: 2h00

II (13.5)

Please round out non-finite numbers to 3 decimal places.

II.A. Consider an economy with **sticky prices** under **float**, where the interest rate parity holds instantaneously, and PPP holds in the long run (one year time). The demand for real money balances is given by $m^D = \frac{Y}{10i}$, where $Y_f = 150$ refers to output (constant). The foreign price level is constant and equal to $P^* = 2$.

a) Assume initially that $M = 150$ and that $i = i^* = 10\%$. Find:

(a1) Real Money Demand

↳ $m^D = \frac{Y}{10i} = \frac{150}{10 \cdot 0,1} = 150$

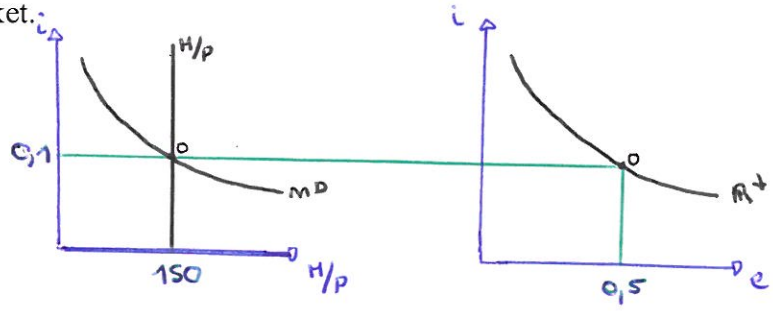
(a2) Price Level

↳ $\frac{M}{P} = m^D \Leftrightarrow \frac{150}{P} = 150 \Leftrightarrow P = 1$

(a3) Nominal Exchange Rate

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

(a4) Represent graphically the equilibrium in the money market and in the foreign exchange market.:



b) Assume that there's a **temporary** positive output shock, so that: $Y' = 300$. Considering that the central bank keeps the money supply unchanged, find:

(b1) The domestic interest rate

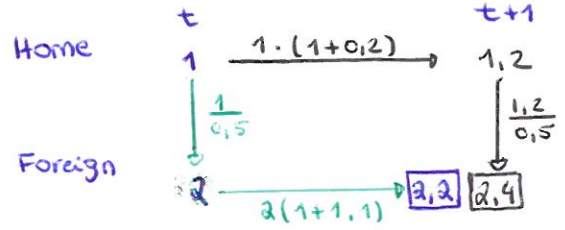
↳ $\frac{M}{P} = m^D \Leftrightarrow \frac{150}{1} = \frac{300}{10i} \Leftrightarrow 1500i = 300 \Leftrightarrow i = 0,2$ (↑)

↳ fixed, as we are in the SR

NOVA

Number: **Name:**

(b2) Assume that the nominal exchange rate is still the same as in (a3). If you needed money in the foreign country in one year, would you prefer to transfer the money today and invest in the foreign country or to invest in the domestic country today and transfer the money in 12 months?



$i = 0,2$
$i^* = 0,1$
$e = 0,5 = E(e)$

Therefore, it is better to invest at Home and transfer the money in 12 months

(b3) If all agents in the economy did the same as you, how would the nominal exchange rate adjust?

↳ The shock is temporary, and so the $E(e)$ does not change (equal to 0,5)

↳ In the equilibrium, there will be no arbitrage opportunities

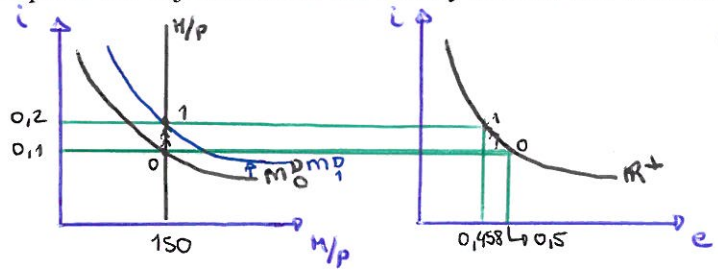
↳ By the UIRP, $(1+i) = (1+i^*)\frac{E(e)}{e} \Leftrightarrow 1,2 = 1,1 \cdot \frac{0,5}{e} \Leftrightarrow e = 0,458$ //

(b4) Using the nominal exchange rate found in (b3), is the currency at premium or at discount? (*Tip: you don't need to compute the forward, just compare the spot rate with the expected rate*)

↳ $e = 0,458 \wedge E(e) = 0,5$.

↳ $e < E(e) \Rightarrow$ the currency is at premium

(b5) Explain the adjustment in the money market and in the foreign exchange market.



→ same M/P ($\Delta M = \Delta P = 0$)

→ same R^+ ($\Delta E(e) = \Delta i^* = 0$)

→ new M^D curve (as $y \uparrow$)

→ overall: $i \uparrow$ // $e \downarrow$

c) Assume now that with the same **temporary** output expansion ($Y' = 300$), the central bank wants instead to keep the exchange rate fixed.

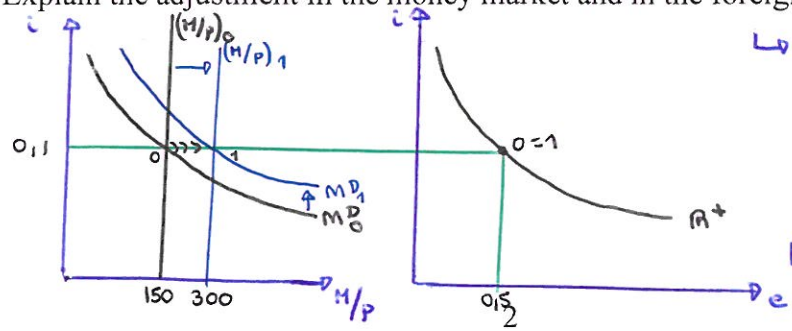
(c1) Compute the implied money supply.

↳ $\bar{e} = 0,5$. Then, $E(e) = \bar{e} \Rightarrow i = i^* = 0,1$

↳ $m^D = \frac{y}{10i} = \frac{300}{10 \cdot 0,1} = 300$ } $\frac{M}{P} = m^D \Leftrightarrow M = \bar{P} m^D \Leftrightarrow M = 1 \cdot 300 \Leftrightarrow M = 300$

↳ Still fixed

(c2) Explain the adjustment in the money market and in the foreign exchange market.



↳ There are no changes in the forex market. The R^+ curve is the same (no changes in $E(e)$ or i^*) and e and i cannot change so that the peg is kept

↳ $M \uparrow$ and $\bar{P} \Rightarrow M/P$ shifts to the right

↳ M^D shifts upwards as $y \uparrow$

NOVA

Number: **Name:**

II.B. Consider an open economy with **sticky** prices under a **flexible exchange rate regime**. In this economy, money demand is given by $m^D = \frac{Y}{10i}$ and full employment output is $Y_f = 100$. The interest rate parity holds instantaneously, the foreign interest rate is equal to $i^* = 10\%$, and $P^* = 1$. The goods market equilibrium is described by the following expression: $Y = 4\,(\bar{A} + TB)$, where $\bar{A} = 25$, $TB = 5(\theta - 1)$ and $\theta = \frac{eP^*}{P}$. Also, $M = 50$ and $E^e = \frac{1}{2}$. Initially, no policy change is expected.

e) Assuming that $P = 1$, describe the initial equilibrium:
(e1) Derive the expression for the AA & DD Curves.
(e2) Find the equilibrium level of the exchange rate and output.

$$(Tip:\ ax^2 + bx + c = 0 \Leftrightarrow x = \frac{-b+\sqrt{b^2-4ac}}{2a})$$

(e3) Compute the value for the trade balance.
(e4) Is there internal and/or external balance in this economy? Justify.

f) Describe the adjustment in the long-run, assuming no policy intervention:
(f1) Find the long-run value for the price level.
(f2) Find the long-run expression for AA & DD.
(f3) Compute the value for the trade balance.
(f4) Explain the adjustment with the help of the AA-DD diagram.

g) Departing from (d), assume instead that the government tasks the central bank with achieving full-employment in the short-run with a permanent monetary expansion.
(g1) Compute the value for the real money demand when $Y = Y_f$ and $i = i^*$.
(g2) Using the money market equilibrium, find the implied money supply.
(g3) Using the DD curve found in (e1), find the new expected exchange rate.
(g4) Do prices need to adjust in the long-run?
(g5) Find the expression for the AA curve.
(g6) Was this policy successful in achieving internal balance? What about external balance?
(g7) Explain the adjustment with the help of the AA-DD diagram.

h) Departing, again, from (d), assume that the government wants to fix the nominal exchange rate at $\bar{e} = 0{,}5$.
(h1) Using the DD curve found in (e1), find the corresponding output level, and then the implied money supply. Is this policy enough to ensure internal balance?
(h2) Suppose that the government decides to launch an expansionary fiscal policy to achieve full employment. Find the value of autonomous spending ($\bar{A}$) that will ensure this goal.
(h3) Explain the adjustment in the AA-DD diagram. You don't have to derive the expression for the curves, but you will have to include three points in your graph, with the corresponding values for output and the nominal exchange rate: (A) initial equilibrium; (B) equilibrium after the exchange rate is fixed; (C) equilibrium after the change in $\bar{A}$.

II B

$Y_F = 100 \quad m^D = \frac{Y}{10i} \quad i^* = 0{,}1 \quad P^* = 1 \quad Y = 4(\bar{A} + TB) \quad \bar{A} = 25 \quad TB = 5\left(\frac{eP^*}{P} - 1\right) \quad e = \frac{1}{2} \quad M = 50$

e) $P = 1$

e1) DD: $Y = 4(\bar{A} + TB) = 4\left(25 + 5\left(\frac{e \times 1}{1} - 1\right)\right) = 80 + 20e$

AA: $m^D = M/P \iff \frac{Y}{10i} = \frac{50}{1} \iff Y = 500i = 500\left(0{,}1 + \frac{1/2}{e} - 1\right)$

$\Rightarrow Y = \frac{250}{e} - 450$

e2) Equilibrium: $AA = DD \iff \frac{250}{e} - 450 = 80 + 20e \iff 20e^2 + 530e - 250 = 0$

$\Rightarrow e = \frac{-530 + \sqrt{530^2 - 4 \times 20 \times -250}}{2 \times 20} \simeq 0{,}464$

$Y = 80 + 20 \times 0{,}464 \simeq 89{,}28$

e3) $TB = 5\left(\frac{eP^*}{P} - 1\right) = 5\left(\frac{0{,}464 \times 1}{1} - 1\right) \simeq -2{,}68$

e4) $Y = 89{,}28 < Y_F \rightarrow$ No Internal Balance

$TB = -2{,}68 \neq 0 \rightarrow$ No External Balance

We have neither internal nor external balance.

F) Long-Run adjustment

F1) In the LR: $\begin{cases} Y = Y_F = 100 \\ e = E^e \Rightarrow i = i^* = 0{,}1 \end{cases} \rightarrow m^D_{LR} = \frac{Y_F}{10 i^*} = \frac{100}{10 \times 0{,}1} = 100$

$P_{LR} = \frac{M}{m^D_{LR}} = \frac{50}{100} = 1/2$

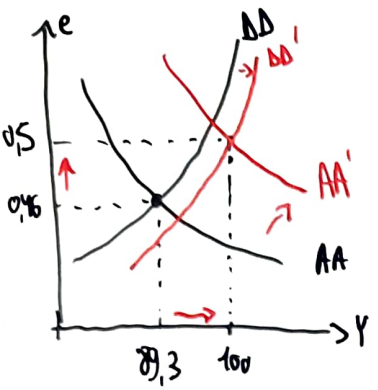
F2) DD: $Y = 4(\bar{A} + TB) = 4\left(25 + 5\left(\frac{e \times 1}{1/2} - 1\right)\right) = 80 + 40e$

AA: $m^D = \frac{M}{P_{LR}} \iff \frac{Y}{10i} = \frac{50}{1/2} \iff Y = 1000i = 1000\left(0{,}1 + \frac{1/2}{e} - 1\right)$

$\Rightarrow Y = \frac{500}{e} - 900$

F3) $TB = 5\left(\frac{eP^*}{P} - 1\right) = 5\left(\frac{1/2 \times 1}{1/2} - 1\right) = 0$

f4)



The price decrease shifts both curves, and we reach the LR eq, with $Y = Y_F$ and $e = E^e$. With lower prices, demand FOR our currency increases, thus forcing the currency to depreciate. This will increase exports and decrease imports, ultimately expanding output.

g) Central Bank wants to achieve $Y = Y_F$ in the short-Run

g1) $m^{D'} = \frac{Y_F}{10i^*} = \frac{100}{10 \times 0,1} = 100$

g2) Prices are sticky: $M = m^{D'} \times \bar{P} = 100 \times 1 = 100$

g3) $Y_F = 80 + 20E^{e'} \Leftrightarrow 100 = 80 + 20E^{e'} \Leftrightarrow 20E^{e'} = 20 \Rightarrow E^{e'} = 1$

g4) Given that the central bank's intervention achieves internal balance in the SR, then prices do not need to adjust in the LR.

g5) AA: $m^D = \frac{M'}{P} \Leftrightarrow \frac{Y}{10i} = \frac{100}{1} \Leftrightarrow Y = 1000i = 1000\left(0,1 + \frac{1}{e} - 1\right)$

$\Rightarrow Y = \frac{1000}{e} - 900$

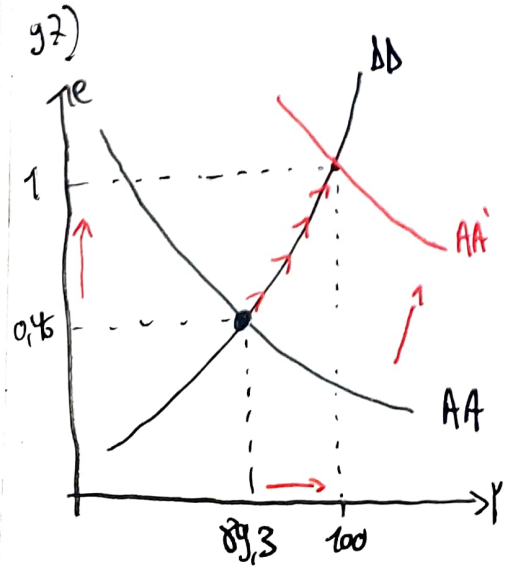
g6) $TB = S\left(\frac{eP^*}{P} - 1\right) = S\left(\frac{1 \times 1}{1} - 1\right) = 0$

$Y = 100 = Y_F \rightarrow$ Internal Balance

$TB = 0 \rightarrow$ External Balance

We have both internal and external balance.

g7)



The CB's expansion of the money supply shifts the AA curve, and we reach a new eq in the SR with full-employment and a depreciated currency.

The DD curve does not change.

The monetary expansion ↓ the domestic interest rate, thus ↑ demand for foreign currency, forcing its price to ↑. With a depreciated currency, the trade balance improves, and output increases.

h) $\bar{e} = 0,5$

h1) with $e = 0,5$: $Y = 80 + 20 \times 0,5 = 90$

In a fixed Regime : $\bar{e} = \bar{E}^e \Rightarrow i = i^*$

$m^D = \frac{Y}{10i^*} = \frac{90}{10 \times 0,1} = 90$

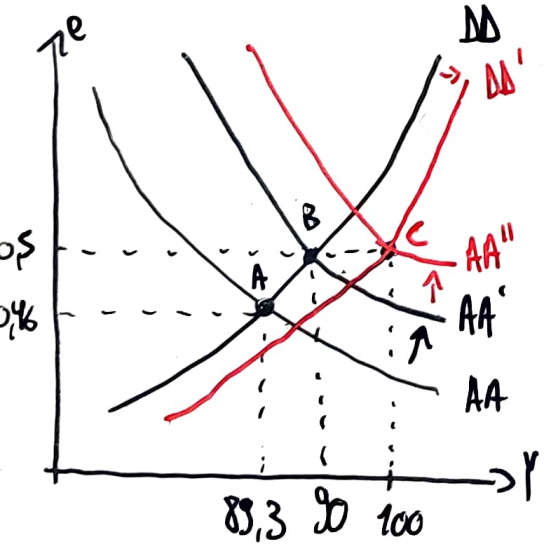
Prices are sticky in the SR : $M = m^D \times \bar{P} = 90 \times 1 = 90$

Internal balance is not achieved, as $Y < Y_F$.

h2) $Y_F = 4(\bar{A}' + TB) \Leftrightarrow 100 = 4(\bar{A}' + 5(\frac{1/2 \times 1}{1} - 1)) \Leftrightarrow 100 = 4\bar{A}' - 10$

$\Leftrightarrow 4\bar{A}' = 110 \Rightarrow \bar{A}' = \frac{110}{4} = 27,5$

h3)



To fix the exchange Rate, the CB will have to expand the money supply. This shifts AA and we move along the DD curve to eq point B. Then, by ↑ autonomous spending, the gvt shifts DD, and the CB ↑ M again to defend the peg. This moves us to eq point C, with both DD and AA having shifted. Internal balance is achieved in this final eq point.