The Global Economy II

Nova SBE – Spring 2023

Miguel Lebre de Freitas, Diogo Lima, Pedro Sousa Coelho

Exam 20/05/2023 – Duration: 2h00

I (4.5)

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

i. Spread between bid and ask

ii. Triangular arbitrage

iii. DD curve

iv. Cost of fixing (in the FIX line)

v. Labour mobility criterium (OCA)

IV (2)

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

a. A Put foreign exchange option gives the owner: (i) the obligation to buy a given amount of foreign currency at a pre-determined exchange rate on a specified date in the future; (ii) the right but not the obligation to buy a given amount of foreign currency at a pre-determined exchange rate on a specified date in the future; (iii) the right and the obligation to sell a given amount of foreign currency at a pre-determined exchange rate on a specified date in the future; (iv) none of the above.

b. A nominal exchange rate depreciation will fail to improve the current account if: (i) imports and exports are inelastic; (ii) domestic wages and prices are indexed to the US dollar; (iii) the volume effect offsets the value effect; (iv) all of the above.

c. Irrespectively of the exchange rate regime, in the long run: (i) government expenditures influence the nominal exchange rate and money drives the price level; (ii) government expenditures drive the price level and money drives the real exchange rate; (iii) government expenditures drive the real exchange rate and money drives the price level; (iv) none of the above.

d. A pure self-fulfilling exchange rate crisis is characterized by: (i) inconsistency between the fiscal policy and nominal stability; (ii) there is a positive net benefit of pegging only in case the peg is credible; (iii) pegging brings more costs than benefits in whatever scenario; (iv) all of the above.

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II (13.5)

Please present the results with, at most, 2 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 $m^D = \frac{Y}{5i}$, where $Y = 100$ refers to output (constant). The foreign price level is constant and equal to 2.

a) Assume initially that $M = 200$ and that $i = i^* = 10\%$. Describe the initial equilibrium:

(a1) Real Money Demand.

(a2) Price Level.

(a3) Nominal Exchange Rate.

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

b) Assume now that agents' liquidity preferences change on a **temporary** basis, such that the equation for real money demand becomes: $m^D = \frac{Y}{10i}$.

(b1) Compute the impact on the domestic interest rate and on (b2) the nominal exchange rate, assuming that the central bank keeps the nominal money supply unchanged.

(b3) Explain the mechanism with the help of a graph.

c) If commercial banks set the forward rate at $F = \frac{1}{4}$, what should investors do: borrow at home and deposit abroad, or borrow abroad and deposit at home? Could banks maintain this forward rate in the long run? Explain.

d) Assume now that the shift in the real money demand was **permanent**.

(d1) Quantify the short run effects on the nominal exchange rate, on the nominal interest rate and on the price level.

(d2) Quantify the long run effects on the nominal exchange rate, on the nominal interest rate and on the price level.

(d3) Describe graphically the short and long-term implications of the shock. Explain the intuition, comparing to what happened in b3).

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IIA

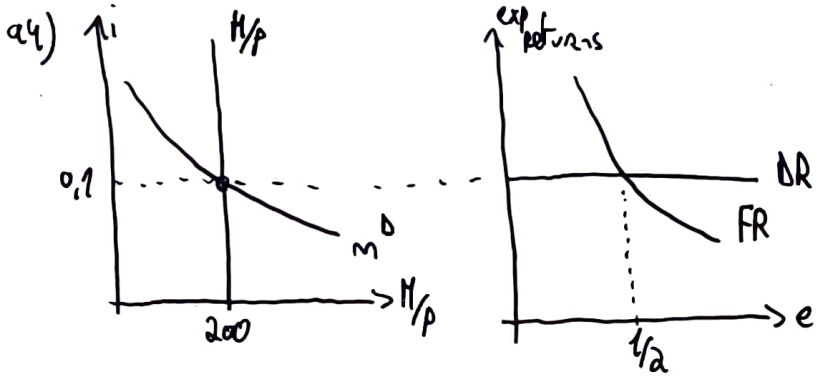
$m^D = Y/5i$ $\quad Y = 100$ $\quad P^* = 2$

a) $M = 200$ $\quad i = i^* = 0,1$

a1) $m^D = Y/5i = \frac{100}{5 \times 0,1} = 200$ $\quad$ a2) $P = M/m^D = \frac{200}{200} = 1$

a3) Since $i = i^*$, then: $e = E^e = P/P^* = 1/2$

a4)



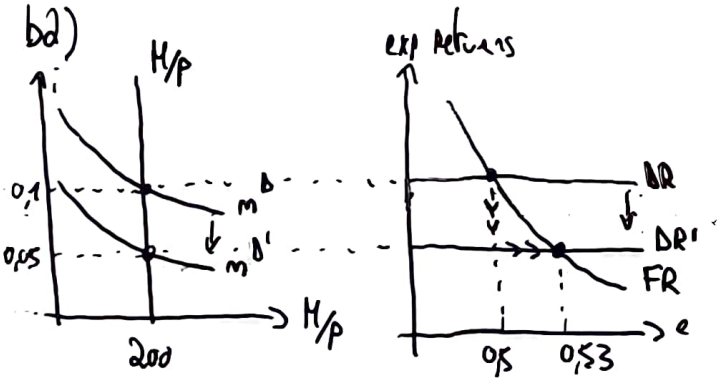
b) $m^{D'} = Y/10i$

b1) This change is temporary, so $\overline{E^e} = 1/2$. CB does not intervene, so: $M = 200$.

$m^D = M/P \iff Y/10i = \frac{200}{1} \iff 10i = Y/200 \iff 10i = \frac{100}{200} \Rightarrow i = 0,05$

UIP: $i = i^* + E^e/e - 1 \Rightarrow e = \frac{E^e}{i - i^* + 1} = \frac{1/2}{0,05 - 0,1 + 1} \simeq 0,53$

b2)



The change in agents' liquidity preferences contracts m^D, and thus $\downarrow i$. This means that with $e = 0,5$, FR > DR, thus the demand for foreign currency will $\uparrow$. Hence, market forces will push the price of foreign currency to $\uparrow$: $e\uparrow$.

c) $F = 1/4$ $\quad e \simeq 0,53$

Borrow at home, deposit abroad: 1 unit of domestic currency $\rightarrow 1/0,53$ units of foreign currency $\rightarrow 1/0,53 \times (1 + 0,1) \simeq 2,075$ units of foreign currency $\rightarrow 2,075 \times 1/4 \simeq 0,52$ units of domestic currency $\rightarrow 0,52 - 1 \times (1 + 0,05) \simeq -0,53$ units of domestic

Borrow abroad, deposit at home: 1 unit of foreign currency → $1 \times 0,53 = 0,53$ units of domestic currency → $0,53 \times (1+0,05) \simeq 0,56$ units of domestic currency → $0,56/0,25 \simeq 2,24$ units of foreign currency → $2,24 - 1 \times (1+0,1) = 1,14$ units of foreign currency.

Investors should borrow abroad and deposit at home.
Since these are arbitrage opportunities to be exploited, commercial banks will not be able to maintain this forward rate.

Eq F: $(1+i) = (1+i^*)\,F/e \iff F = \frac{1+i}{1+i^*}\,e = \frac{1,05}{1,1} \times 0,53 \simeq 0,51$

d) $m^D = Y/10i$ (permanent) We know that in the LR $i = i^*$, so P will adjust to ensure that happens. In turn, this will change E^e.

$$\begin{cases} Y = 100 \\ i = i^* = 0,1 \end{cases} \Rightarrow m^D_{LR} = \frac{Y}{10i} = \frac{100}{10 \times 0,1} = 100 \qquad P_{LR} = \frac{M}{m^D_{LR}} = \frac{200}{100} = 2 \qquad E^{e'} = \frac{P_{LR}}{P^*} = \frac{2}{2} = 1$$

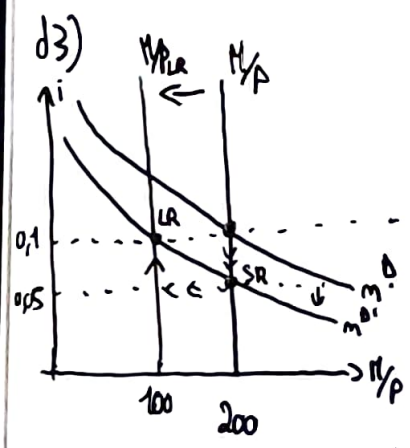
d1) In the SR $\overline{P}$, so $M/P = 200$, hence: $i = 0,05$.

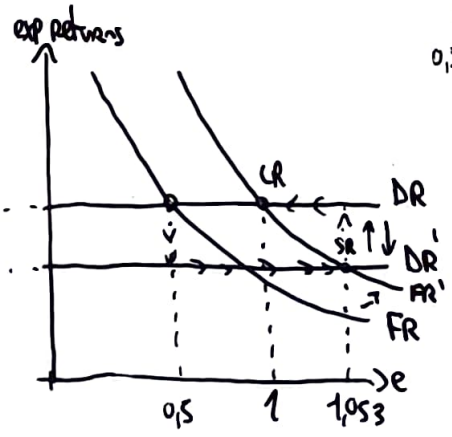
UIP: $e_{SR} = \frac{E^{e'}}{i - i^* + 1} = \frac{1}{0,05 - 0,1 + 1} \simeq 1,053$ The spot rate overshoots its new LR value.

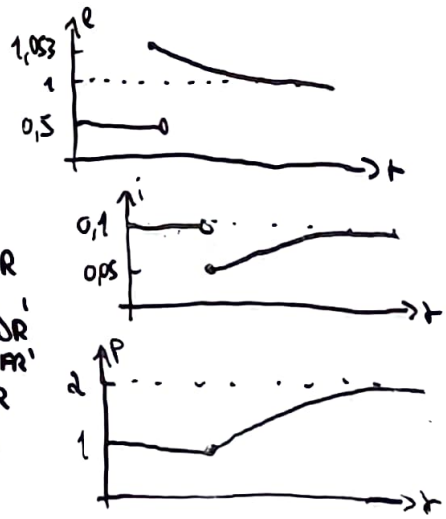
d2) In the LR, P adjust to ensure that $i = i^* = 0,1$: $P_{LR} = 2$.

Since $i = i^*$, then: $e_{LR} = E^{e'} = 1$.

d3)







We have a permanent shock, thus, unlike in question b), the money market will not go back to its original eq. Hence, to ensure that in the LR $i = i^*$, P will have to ↑. This will ↑ E^e, making the FR curve shift permanently in the FX market. In the SR, the nominal exchange rate overshoots its new LR value.

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II.B. Consider an open economy with **sticky** prices under a **fixed exchange rate regime**, with $e = E(e) = 1$. In this economy, money demand is given by $m^D = \frac{Y}{20i}$ and full employment output is $Y_f = 200$. Consider, as well, that $eB_C^* = 20$. The interest rate parity holds instantaneously, the foreign interest rate is equal to $i^* = 20\%$, and, initially, $P = P^* = 1$. The goods market equilibrium is described by the following expression: $Y = 5\,(\bar{A} + TB)$, where $\bar{A} = 38$, $TB = 2 + 5(\theta - 1)$ and $\theta = \frac{eP^*}{P}$.

e) Assuming that the peg is credible:

(e1) Derive the DD Curve.

↳ $y = 5(A + TB)$ (=)

(=) $y = 5A + 5\left[2 + 5(\theta - 1)\right]$ (=)

(=) $y = 5A + 10 + 25\left(\frac{eP^*}{P} - 1\right)$ (=)

(=) $y = 5 \cdot 38 + 10 + 25\frac{e}{P} - 25$ (=)

(=) $y = 175 + 25\frac{e}{P}$

↳ $P = 1 \Rightarrow y = 175 + 25e$ DD_0

(e2) Find the level of output, the endogenous money supply and the Trade Balance.

↳ By the DD, as $\bar{e} = 1$, $y = 175 + 25 = 200$ (y is at full employment)

↳ $m^D = \frac{y}{20i} = \frac{200}{20 \cdot 0{,}2} = 50$

↳ $M = P \cdot m^D = 1 \cdot 50 = 50$

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

(e3) Derive the AA Curve.

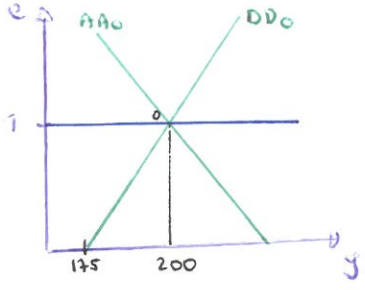
↳ By the MM equilibrium, $\frac{y}{20i} = \frac{M}{P}$ (=) $20i = \frac{P}{M}y$ (=) $i = \frac{P}{M}\frac{y}{20}$

↳ Then, $\frac{P}{M}\frac{y}{20} = i^* + \frac{E(e)}{e} - 1$ (=) $\frac{1}{50}\frac{y}{20} = 0{,}2 + \frac{1}{e} - 1$ (=)

(=) $\frac{y}{1000} = -0{,}8 + \frac{1}{e}$ (=)

(=) $y = -800 + \frac{1000}{e}$ AA_0

(e4) Represent initial in the AA-DD diagram.



The AA-curve could be represented in a non-linear way as well.

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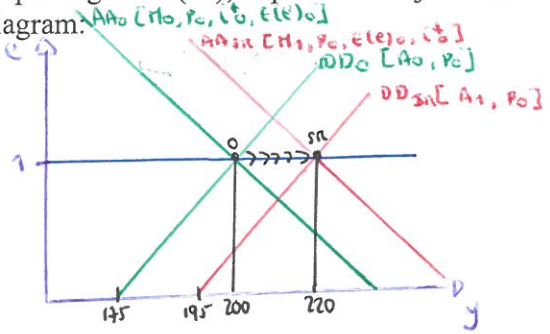
f) Election season is fast approaching, and our government has a low approval rating. To boost its electoral chances, the ruling party decides to implement a permanent fiscal expansion, such that: $\bar{A}' = 42$. Assume that the central bank **keeps** the peg.

(f1) Departing from (e4), explain the adjustment towards the short run equilibrium in the AA-DD diagram:



AA shifts to the right as M ↑ [see f5]

DD shifts to the right as A ↑

(f2) Find the expression of the DD curve in the short-run.

↳ $y = 5[42 + 2 + 5e_{P/P} - 5] = 195 + 25e_{P/P}$

↳ As $p = 1$, $DD_{SR}: \; y = 195 + 25e$ DD_{SR}

(f3) Find the implied level of output.

↳ As $e = 1$, $y = 195 + 25 \cdot 1 = 220$ (output goes beyond full employment)

(f4) Find the expression of the AA in the short-run.

↳ $m^D = \frac{y}{20i} = \frac{220}{20 \cdot 0{,}2} = 55$

↳ $M = P \cdot m^D = 1 \cdot 55 = 55$

↳ $y = \frac{M}{P} \cdot 20\left[i^* - 1 + \frac{E(e)}{e}\right] \Leftrightarrow y = \frac{55}{1} \cdot 20\left[-0{,}8 + \frac{1}{e}\right] \Leftrightarrow y = 1100\left[-0{,}8 + \frac{1}{e}\right] \Leftrightarrow$

$\Leftrightarrow y = -880 + \frac{1100}{e}$ AA_{SR}

(f5) Explain, quantifying, what happens to the central bank balance sheet.

↳ $M_0 = 50$

We know that $eB^{+}_{CB_0} = 20$, meaning that $eB^{+}_{CB_0} + BcB_0 = M_0 \Leftrightarrow 20 + BcB_0 = 50 \Leftrightarrow$

$\Leftrightarrow BcB_0 = 30$

↳ After the policy, $M_1 = 55$

The policy has no effect on domestic credit $\Rightarrow BcB_1 = BcB_0 = 30$

then, the adjustment is done through forex $\Rightarrow \Delta eB^{+}_{CB_1} = \Delta M = 5$

So, $M_1 = 55$ (↑)

$BcB_1 = 30$ (=)

$eB^{+}_{CB_1} = 25$ (↑)

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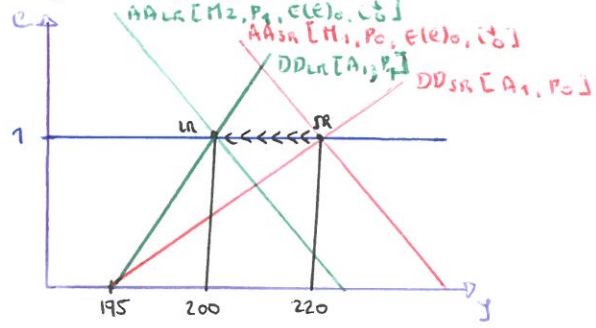
(f6) Departing from (f1), explain the adjustment towards the long run in the AA-DD diagram.



The AA in the LR is the same as the original one [see f7]

(f7) Find the long-run price level and the expressions of the DD and AA curves.

↳ $m^D = \frac{y}{20i} = \frac{200}{4} = 50$ (y = 200 as, in the LR, $y = y_F$)

↳ DD: $y = 195 + 25\frac{e}{P}$. As $y = 200$ and $e = 1$, $200 = 195 + \frac{25}{P} \Leftrightarrow P_{LR} = 5$

↳ Then, $DD_{LR}: y = 195 + 5e$ DD_{LR}

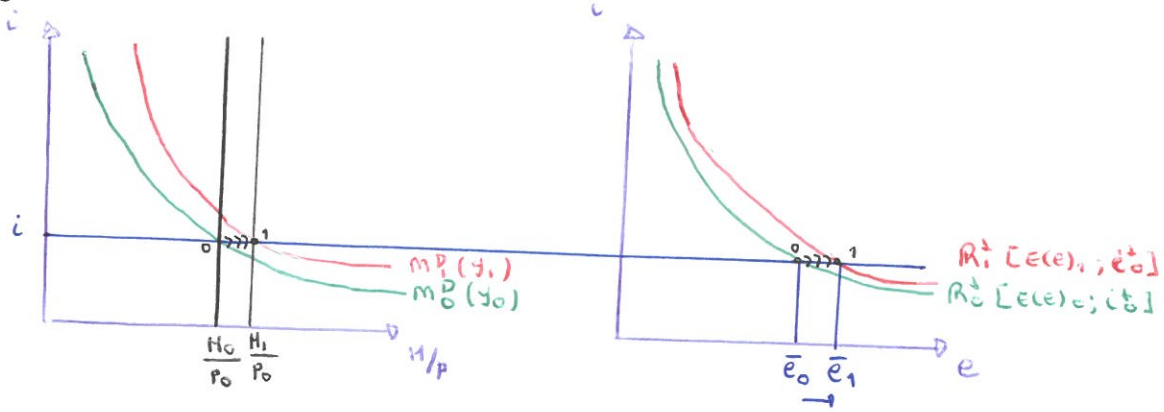
↳ $M = P \cdot m^D = 5 \cdot 50 = 250$

↳ AA: $y = \frac{M}{P} \cdot 20\left[i^* - i + \frac{E(e)}{e}\right] \Leftrightarrow y = \frac{250}{5} \cdot 20\left(-0.3 + \frac{1}{e}\right) \Leftrightarrow$

$\Leftrightarrow y = -300 + \frac{1000}{e}$ $AA_{LR} = AA_0$

g) Returning to (e), assume instead that the government decided to credibly devalue the peg to $e' = 1.8$.

(g1) Describe graphically the immediate adjustment in the money market and in the foreign exchange market.



- Devaluation ⇒ $\bar{e}$ ↑ ⇒ E(e) ↑
- Pegs are credible ⇒ E(e) = e ⇒ $i = i^*$ [i^* is the same ⇒ i is the same]
- y ↑ ⇒ m^D shifts upwards ⇒ M ↑

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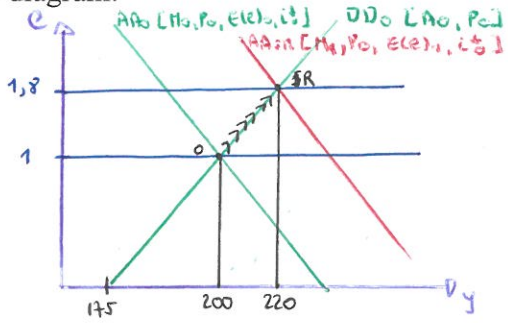
(g2) Departing from (e4), explain the adjustment towards the short run equilibrium in the AA-DD diagram:



↳ DD is the same as both A and P are the same

↳ AA shifts due to ΔM and due to Δ E(e) [the expectations adjust to the new reg]

(g3) Find the implied level of output

↳ DD is the same as in e)

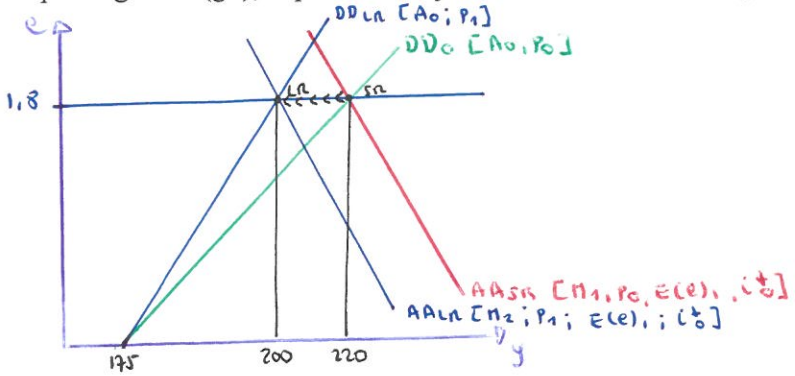
↳ Given that $\bar{e} = 1,8$; $Y = 175 + 25 \cdot 1,8 = 220$ [above full employment]

(g4) Find the implied level of the money supply.

↳ $M^D = \frac{Y}{2i} = \frac{220}{20 \cdot 0,2} = 55$

↳ $M = P \cdot M^D = 1 \cdot 55 = 55$ (↑)

(g5) Departing from (g2), explain the adjustment towards the long run, referring to the AA-DD



↳ DD shifts due to the new price level

↳ AA shifts due to the new money supply / price level

↳ $AA_{LR} \neq AA_0$ now

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(g6) Find the price level that holds in the long-run and the corresponding expression for DD

↳ DD: $y = 175 + 25\,e/p$ with $y = 200$ [LR $\Rightarrow y = \bar{y}$] and $e = \bar{e} = 1{,}8$

Then, $y = 175 + 25\,e/p \Leftrightarrow 200 = 175 + \frac{25 \cdot 1{,}8}{p} \Leftrightarrow p = 1{,}8$ ($\bar{p}$)

↳ DD_{LR}: $y = 175 + \frac{25}{1{,}8}\,e \Leftrightarrow y = 175 + 13{,}89\,e$ DD_{LR}

(g7) Find the long run money supply and the corresponding AA curve.

↳ $M^D = \frac{y}{20i} = 50$

↳ $M = P \cdot M^D = 1{,}8 \cdot 50 = 90$

↳ $y = \frac{M}{P} \cdot 20\left[i^* - 1 + \frac{E(e)}{e}\right] \Leftrightarrow y = \frac{90}{1{,}8} \cdot 20\left[-0{,}8 + \frac{1{,}8}{e}\right] \Leftrightarrow y = 1000\left(-0{,}8 + \frac{1{,}8}{e}\right)$

$\Leftrightarrow y = -800 + \frac{1800}{e}$

AA_{LR}

h) Compare the short run and long run effects of the measures presented in f) and g) in the trade balance. Explain the intuition behind the different results.

↳ TB [SR, f] $= 2 + 5\left(\frac{1 \cdot 1}{1} - 1\right) = 2$ (=)

↳ TB [LR, f] $= 2 + 5\left(\frac{1 \cdot 1}{5} - 1\right) = -2$ (↓)

↳ TB [SR, g] $= 2 + 5\left(\frac{1{,}3 \cdot 1}{1} - 1\right) = 6$ (↑)

↳ TB [LR, g] $= 2 + 5\left(\frac{1{,}8 \cdot 1}{1{,}8} - 1\right) = 2$ (=)

Note that $TB = 2 + 5\left(\frac{ep}{P} - 1\right)$

- Fiscal Expansion [SR] – TB is the same as prices are sticky and the peg didn't change.
- Fiscal Expansion [LR] – TB worsens, as prices increased, and the peg didn't change.
- Devaluation [SR] – TB improves, as prices are sticky, but the peg was devaluated.
- Devaluation [LR] – TB returns to the original level: the positive effect on e is offset by the increase in prices.
- Overall, the devaluation is able to achieve a positive impact on the trade balance in the short run, which is not achievable with the permanent fiscal expansion. This has to do with the fact that the devaluation makes exports more competitive, and imports more expensive, thus depreciating the real exchange rate. On the long run, the devaluation will have no impact in terms of trade balance (the TB will be the same as in the beginning). The same is not true for the permanent fiscal expansion case, where there is actually a trade balance deficit in the long run.
- Whether policymakers should apply one or the other measure depends on many factors, but if the goal is to have external surpluses the devaluation is preferred over the permanent fiscal expansion.