ECON 2102A , Homework Assignment #2

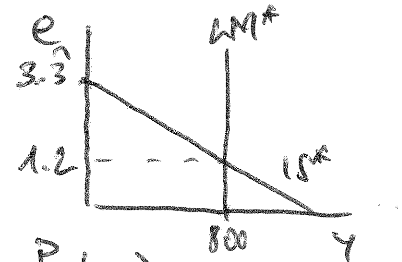
1. Mundell-Fleming exercise (50%)

a) (IS*) $Y = C + I + G + NX$

$Y = 80 + 0.6(Y - 100) + 500 - 100(2.5) + 100 + 130 - 150e$

$0.4Y = 500 - 150e$

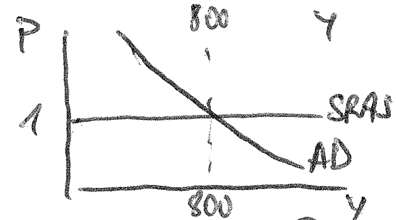
$150e = 500 - 0.4Y \rightarrow \boxed{e = 3.\hat{3} - 0.002\hat{6}Y}$ IS*



(LM*) $\frac{M}{P} = L(Y, r^*)$

$\frac{475}{1} = 0.75Y - 50(2.5)$

$0.75Y = 600$ $\boxed{Y = 800}$ LM*



(AD) Let us write the LM* curve for a variable P:

$\frac{475}{P} = 0.75Y - 50(2.5)$

$\frac{475}{P} = 0.75Y - 125 \rightarrow \boxed{P = \frac{475}{0.75Y - 125}}$ AD

b) $\begin{cases} e = 3.\hat{3} - 0.002\hat{6}Y \\ Y = 800 \end{cases}$

$e = 3.\hat{3} - 0.002\hat{6}(800) = \boxed{1.2}$

$\boxed{Y = 800}$

$C = 80 + 0.6(800 - 100) = \boxed{500}$

$I = 500 - 100(2.5) = \boxed{250}$

$NX = 130 - 150(1.2) = \boxed{-50}$

c) Target → $Y = 900$

Policy instrument → M ⇒ $\uparrow M$, $\overrightarrow{LM^*}$ → $\uparrow Y$

Lode

LM^* curve

$$\frac{M}{P} = L(Y, r^*) \quad \text{with } Y = 900$$

$$\frac{M}{1} = 0.75(900) - 50(2.5) = \boxed{550}$$

nominal money

from 475 to 550 . $\Delta M = 75$ (mon. expansion)

The equilibrium exchange rate is found in the IS curve

$$e = 3.\overline{3} - 0.002\hat{6}Y = 3.\overline{3} - 0.002\hat{6}(900) = \boxed{0.9\overline{3}}$$

Nominal exchange rate falls from 1.2 to $0.9\overline{3}$ (depreciation)

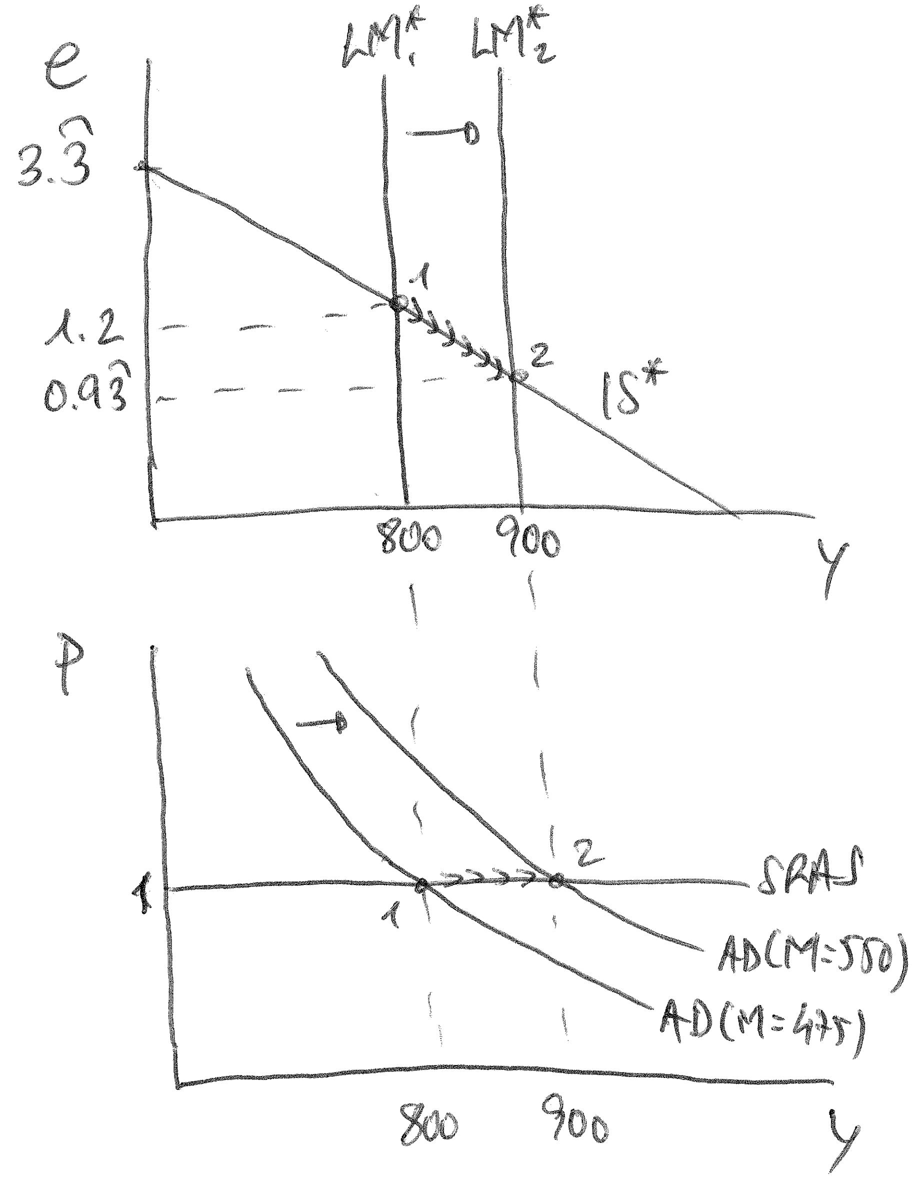
$$100\left(\frac{0.9\overline{3} - 1.2}{1.2}\right) = -22.22\%$$

The domestic currency depreciates by 22.22%

$C = 80 + 0.6(900 - 100) = \boxed{560}$ Increase by 60 units

$I = 500 - 100(2.5) = \boxed{250}$ No change

$NX = 130 - 150(0.9\overline{3}) = \boxed{-10}$ Increase by 40 units d)


e
LM*1
LM*2
3.3̂
1
1.2
0.93̂
2
IS*
800
900
Y
P
2
1
SRAS
1
AD(M=550)
AD(M=475)
800
900
Y

2. Solow model exercise (50%)

$y = \sqrt{k}$ $\quad s = 0.25$ $\quad \delta = 0.08$ $\quad n = 0.02$ $\quad k_0 = 4$

a) $\Delta k = s \cdot f(k) - (\delta + n) k$

$\Delta k = 0.25\sqrt{k} - (0.08 + 0.02) k$

$\Delta k_0 = 0.25\sqrt{k_0} - 0.1 k_0 = 0.25\sqrt{4} - 0.1(4) = 0.10$

$k_1 = k_0 + \Delta k_0 = 4 + 0.1 = \boxed{4.10}$

$y_1 = \sqrt{k_1} = \sqrt{4.10} = \boxed{2.025}$

$c_1 = (1-s) y_1 = (1-0.25) 2.025 = \boxed{1.519}$

b) $\begin{cases} \Delta k = s \cdot f(k) - (\delta + n) k \\ \Delta k = 0 \end{cases}$ $\rightarrow$ Equation of motion for k; $\longrightarrow$ Steady-state condition

$0 = s f(k) - (\delta + n) k$

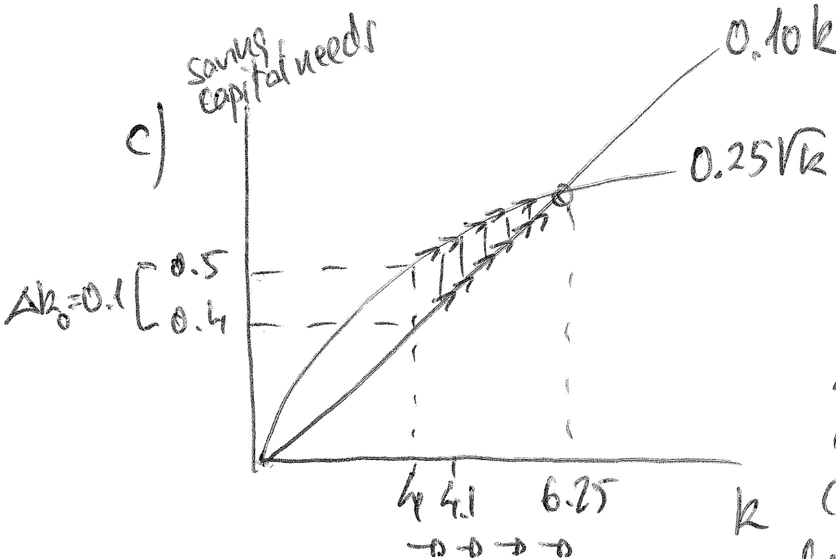
$0 = 0.25\sqrt{k} - (0.08 + 0.02) k \rightarrow 0.25\sqrt{k} = 0.1 k$

$\frac{0.25}{0.1} = \frac{k}{\sqrt{k}} \rightarrow 2.5 = \sqrt{k} \rightarrow k = 2.5^2 = \boxed{6.25}$

$y = \sqrt{k} = \sqrt{6.25} = \boxed{2.5}$

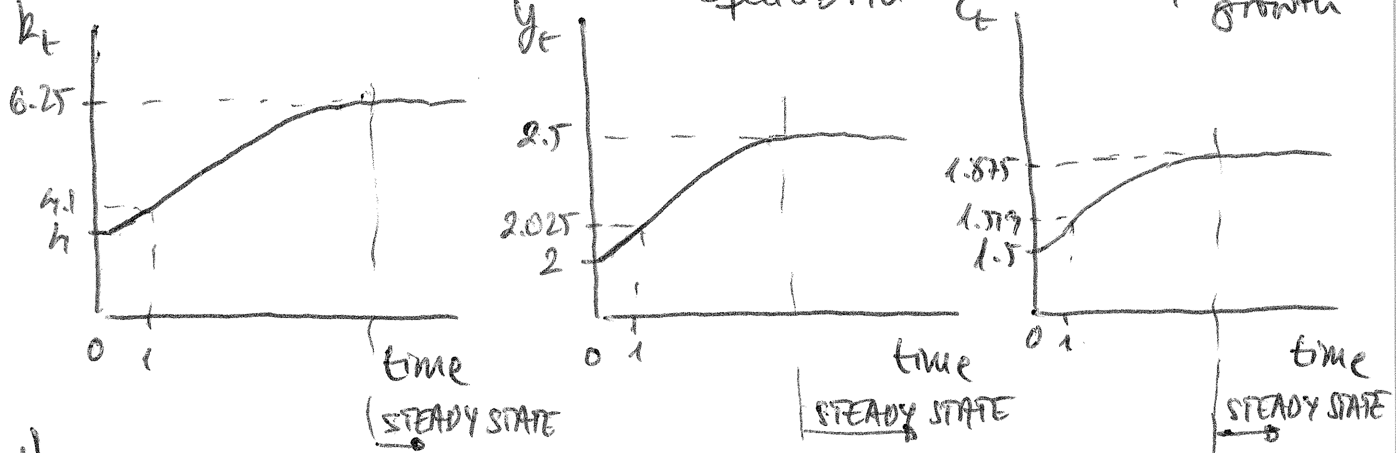
$c = (1-s) y = (1-0.25) 2.5 = \boxed{1.875}$

c)

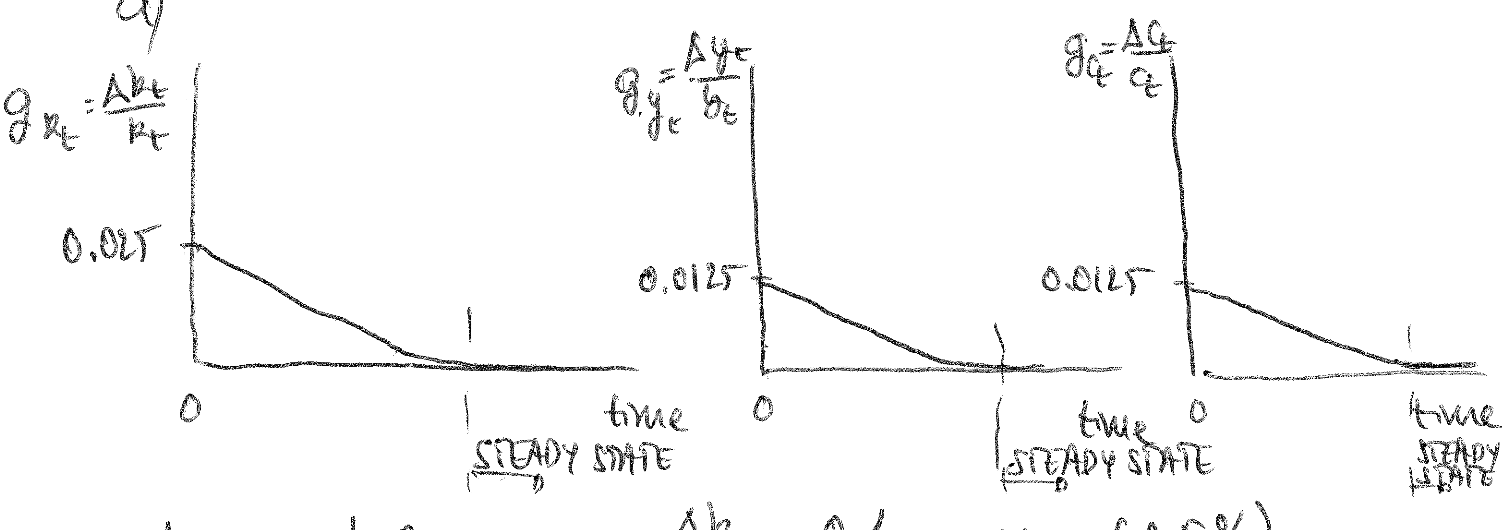


As long as savings per worker ($0.25\sqrt{k}$) are higher than the capital requirements ($0.10k$), $\Delta k > 0$, there will be capital accumulation, economic growth ($\Delta y > 0$), and consumption growth ($\Delta C > 0$)

In the long-run → steady-state equilibrium with no per-worker growth



d)



In period 0 → $g_{k_0} = \frac{\Delta k_0}{k_0} = \frac{0.1}{4} = 0.025 \; (2.5\%)$

$g_{y_0} = \frac{\Delta y_0}{y_0} = \frac{0.025}{2} = 0.0125 \; (1.25\%)$

$g_{C_0} = \frac{\Delta C_0}{C_0} = \frac{0.019}{1.5} = 0.0125$ → 1.25%

Per-worker rates of grow are decreasing until they reach 0%

In steady-state → $g_k = g_y = g_c = 0$

e) $k_t = \frac{K_t}{L_t} \longrightarrow g_{k_t} = g_{K_t} - g_{L_t}$

$$g_{K_t} = g_{k_t} + g_{L_t} = g_{k_t} + \frac{\Delta L_t}{L_t} = g_{k_t} + 0.02$$

Similarly:

$$g_{Y_t} = g_{y_t} + g_{L_t} = g_{y_t} + 0.02$$

$$g_{C_t} = g_{c_t} + g_{L_t} = g_{c_t} + 0.02$$

The rates of growth of the aggregate variables will be decreasing over time to reach the long-run equilibrium value in steady state at 2%.