Multiple Choice

1	a
2	a
3	b
4	e
5	d
6	a

Question 1

Exercise 1) $\pi^e = \bar{\pi}$

$\pi_t = 3\% - 0,2u_t$

a) $\bar{\pi} = 2\%$

$0,02 = 0,03 - 0,2u_t$

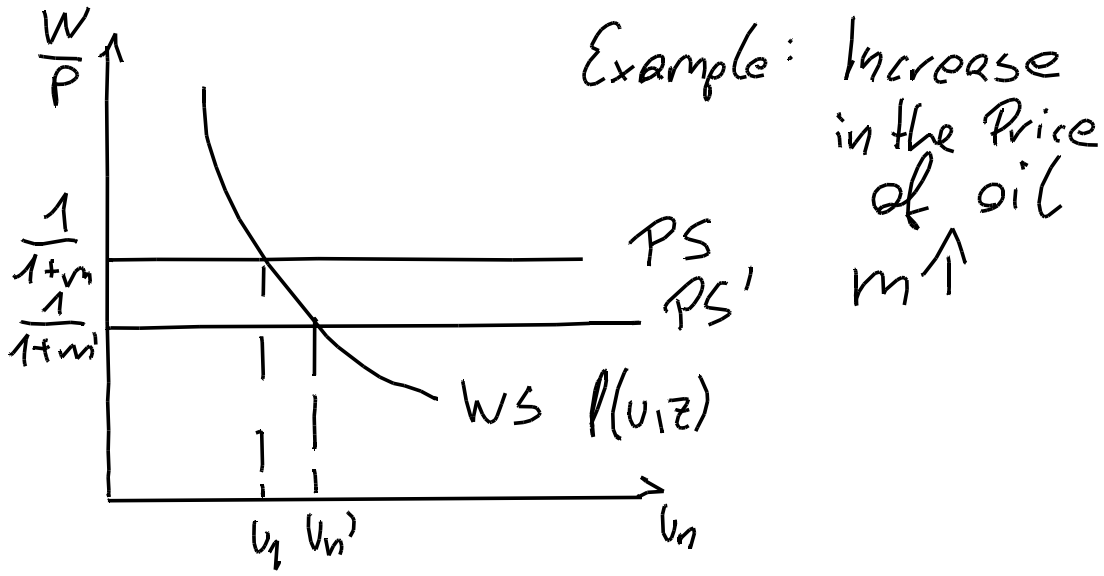
$-0,01 = -0,2u_t$

$\frac{-0,01}{-0,2} = u_t$

$u_t = 0,05 = 5\%$

The natural rate of unemployment equals 5%.

b) The natural level of unemployment is affected by changes in inflation which varies across countries. The same goes for the catch all variables z and m which trough the WS and PS relation have an effect on inflation. As the variables differ between countries (minimum wage, resource prices, competition) there is a difference between countries in natural rate of unemployment.



An increase in the price of oil, captured by an increase in the catch all variable m, leads to a shift of the PS equation, leading to a higher rate of natural unemployment.

c)

$$c)\ \pi - \overline{\pi} = \frac{\alpha}{L}(Y - Y_n)$$

Initially $Y = Y_n$

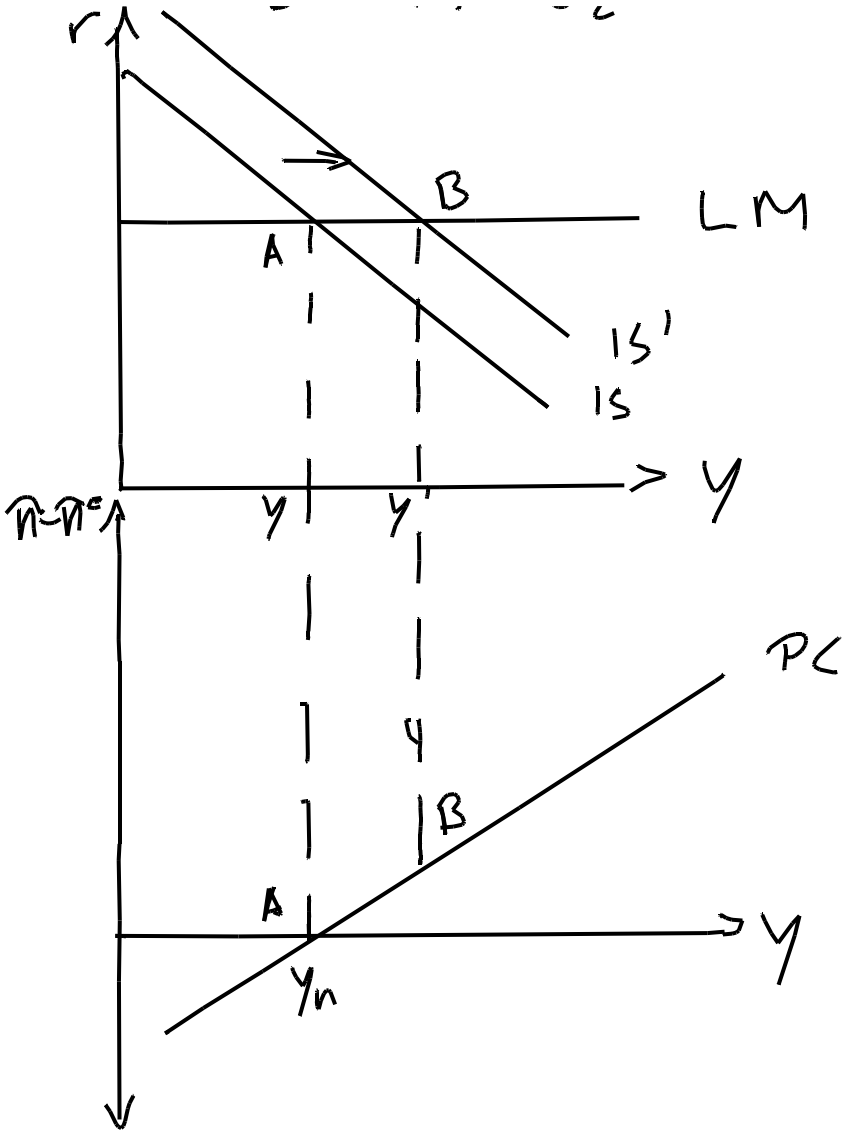
$$I = b_0 + b_1 Y - b_2 r \qquad (b_0 \uparrow)$$

An increase in b0 leads to an leftwards shift of the IS curve. (A -> B)

As b0 increases, Y increase which leads to further increase in I and an increase in YD leading to an increase in Consumption which trough the multiplier increases Y and so on.

As Y increases, N increases leading to a decrease in u which increase wages, which leads to an increase in prices and inflation increases as a result.

We move leftwards along the PC curve. (A -> B)

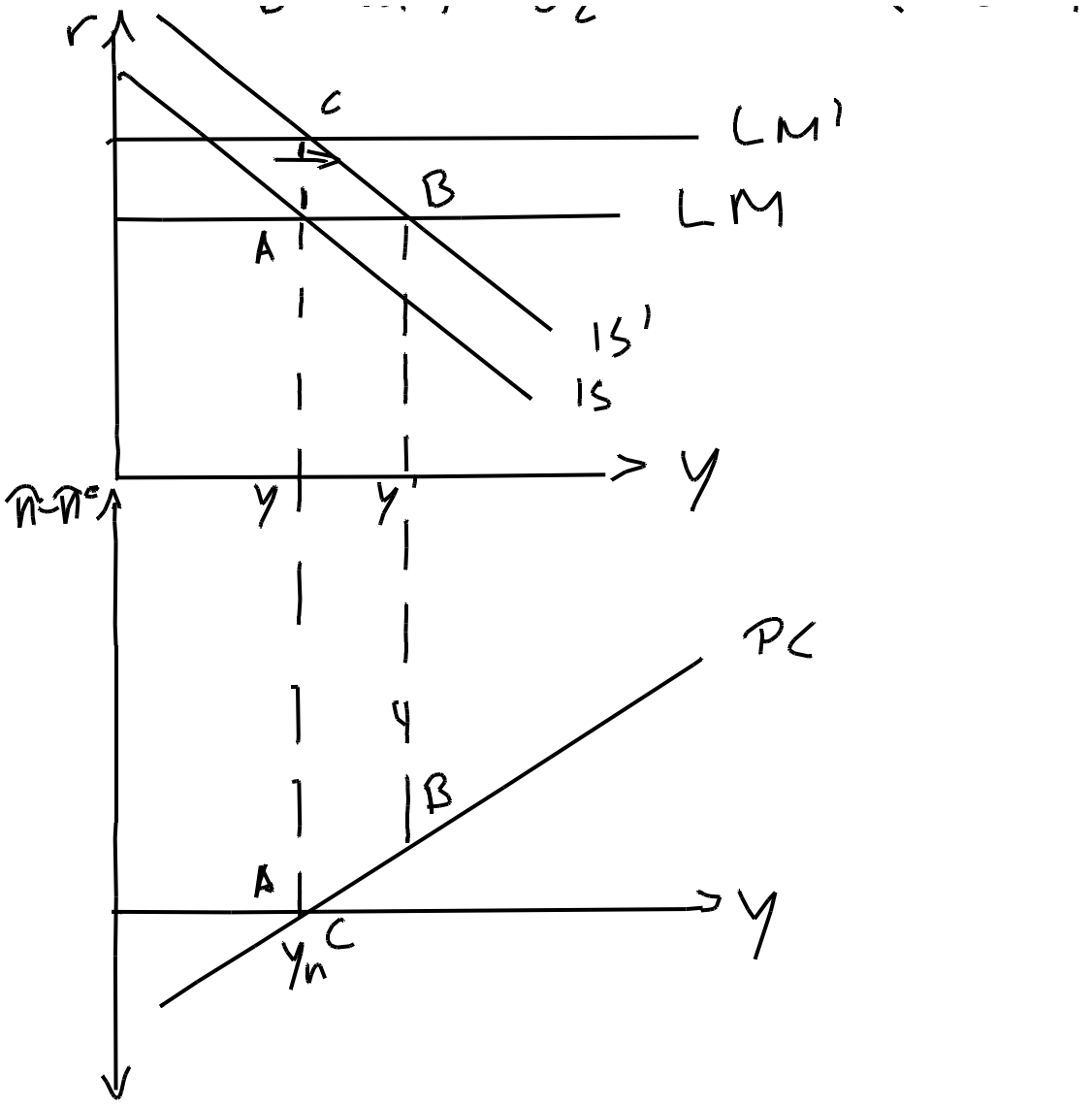


d) The Central Bank has the goal of keeping inflation at the target level. As inflation has increased we expect the Central Bank to implement a contractionary monetary policy, increasing the interest rate and shifting the LM curve upwards and movement along the new IS curve. (B -> C)

The level of output and consumption will be back at the initial level. While there is no effect on b0, Investment decreases as a result of the reduction in Y and the increase of the interest rate.

The decrease in Y leads to lower N which leads to higher unemployment, reducing Wages and Prices, which cause inflation to decrease.

Inflation is back at target. (B -> C)



e) Inflation is equal to before and at the targeted level. Consumption is back at the initial level.

Investment is back at the initial level but the composition has changed. b0 being higher and b2r being higher than at the initial level. As output is back at the initial level, so is b1Y.

Question 2

Ex 2) $C = c_0 + c_1 (Y - T)$

$I = b_0 + b_1 Y - b_2 (r + x)$

$c_0 = 400$, $c_1 = 0,6$, $b_0 = 200$, $b_1 = 0,2$

$b_2 = 2000$

$T = 500$, $G = 600$, $r = 0,01$, $x = 0$

$Z = C + I + G$ At equil.: $Z = Y$

$LM = r = 0,01$

IS: $Y = C + I + G$

$Y = c_0 + c_1 (Y - T) + b_0 + b_1 Y - b_2 (r + x) + G$

$Y = c_0 + c_1 Y - c_1 T + b_0 + b_1 Y - b_2 (r + x) + G$

$Y - c_1 Y - b_1 Y = c_0 - c_1 T + b_0 - b_2 (r + x) + G$

$Y (1 - c_1 - b_1) = c_0 - c_1 T + b_0 - b_2 (r + x) + G$

$Y = \frac{1}{1 - c_1 - b_1} (c_0 - c_1 T + b_0 - b_2 (r + x) + G)$

$$Y = \frac{1}{1-0,6-0,2}\left(400 - 0,6 \cdot 500 + 200 - 2000(r) + 600\right)$$

$$Y = \frac{1}{0,2}\left(900 - 2000r\right)$$

$$Y = 5\left(900 - 2000r\right)$$

IS: $Y = 4500 - 10000r$

$Y = 4500 - 10000 \cdot 0,01 = \underline{4400}$

$Y_D = Y - T = 4400 - 500 = \underline{3900}$

$C = c_0 + c_1(Y-T) = 400 + 0,6(3900) = \underline{2740}$

$I = b_0 + b_1 Y - b_2(r+>) = 200 + 0,2 \cdot 4400 - 2000(0,01$

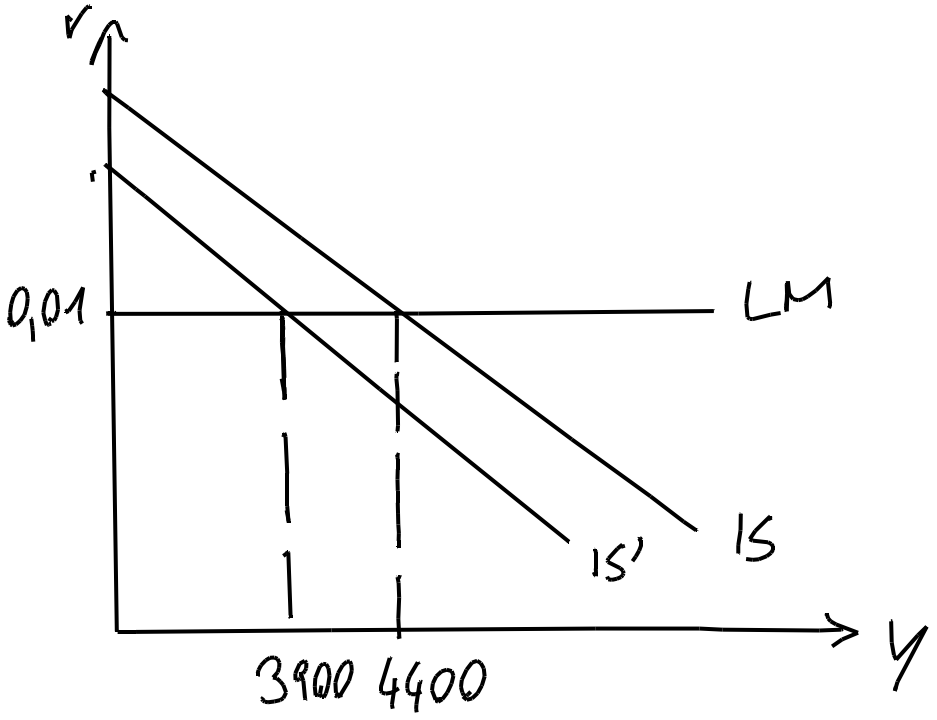
$= \underline{1060}$

b)

b) $C_0 = 300$

$Y = 5\left(800 - 2000r\right)$

Y= 4000-10000r = 4000-100= <u>3900</u>



As c0 decreases, Y decreases, this leads to a decrease in YD and c1Y which further reduces Consumption and also Investment. Y is lower. This process continues via the multiplier.

c) The government will use an expansionary fiscal policy to bring output back to its initial level. This either means increasing G or decreasing T. This would (as Ricardian equivalence does not hold) increase consumption, increasing output back to initial level.

c) $4400 = 5(300 - 0,6 \cdot T + 200 - 2000 \cdot 0,01 + 600)$

$4400 = 5(1100 - 0,6T - 20)$

$4400 = 5(1080 - 0,6T)$

$4400 = 5400 - 3T$

$3T = 1000$

$T = 333,33$

d) If Ricardian equivalence holds, consumers will expect Government spending to decrease after taxes were reduced and therefore not increase their consumption. This means that output is

unaffected and remains at the level found in b). Therefore, the government cannot use fiscal policy (decrease in taxes) to affect output positively (or negatively).

e) The decrease in Taxes (not followed up by decrease in G) would increase the Debt to GDP ratio as spending is at a higher level than taxes, meaning the economy is not balanced and funding a part of the Spending (G-T) through debt. This will increase r as the amount of debt increases causing debt to increase while also increasing the perceived risk of default. This would mean that overtime output would be increasingly negatively affected by the higher interest rate further increasing public debt. A decrease in output would mean that growth (g) is negative further increasing public debt. Causing a debt spiral. The primary deficit/debt level of Gt-Tt / Yt would remain constant.

Question 3

Exercise 3) $Y = F(K, AN)$

$A = 1$ $\quad I = S$

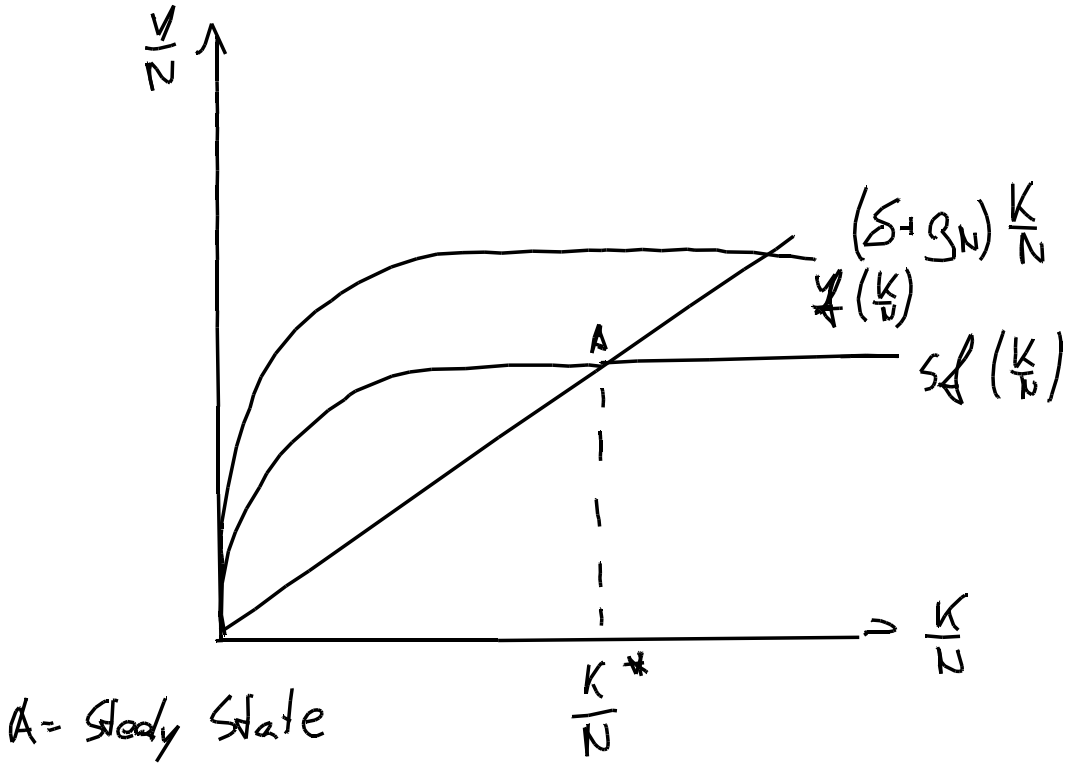
Q) $\Delta \frac{K}{N} = \frac{I}{N} - (\delta + g_N)\frac{K}{N}$

At the S.S: $sf\left(\frac{K}{N}\right) = (\delta + g_n)\frac{K}{N}$

$sA\left(\frac{K^*}{N}\right) = (\delta + g_n)\frac{K^*}{N}$

$\frac{sA}{\delta + g_n} = \frac{K^*}{N}$

$\frac{S}{\delta + g_N} = \frac{K^*}{N}$



A = Steady State

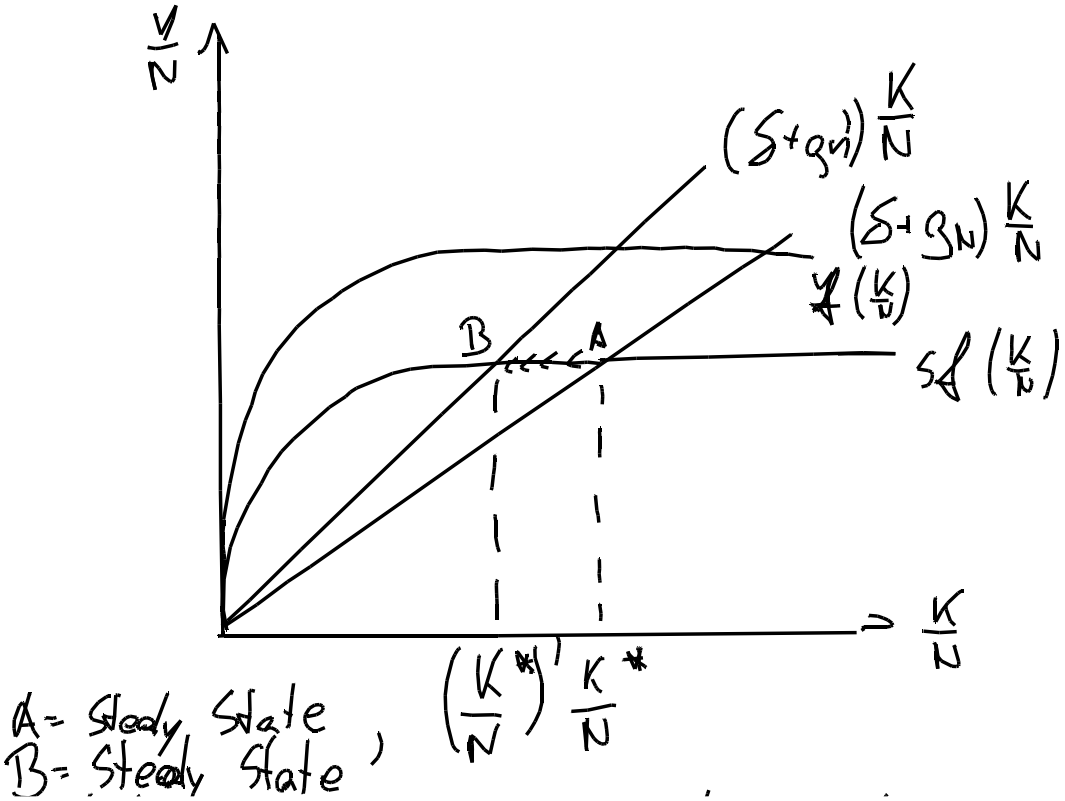
f(K/N) is convex as we have decreasing marginal returns to scale.

sf(K/N) mimics the f(K/N), Output function, so the shape of the Investment curve is similar.

Depreciation Curve (δ+gN) K/N is an upwards sloping straight line per definition

At the steady state output per worker and output grow at a rate equal to gN. Growth at the steady state is constant as savings equal depreciation, but considering gN we get that they grow at his rate.

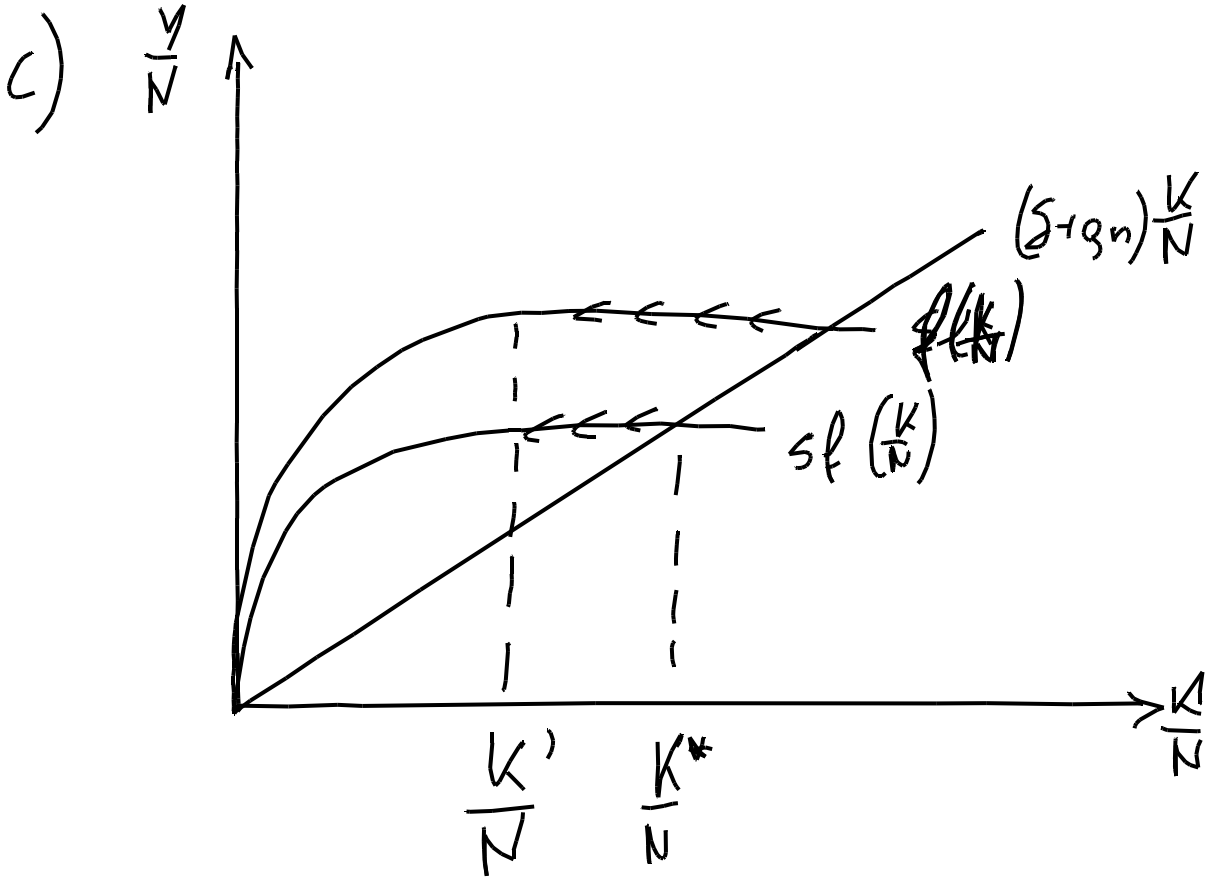
b)



The depreciation line will rotate and the capital stock per worker will decrease until reaching a new steady state in the long run. This steady state will be at a lower level of capital stock and output.

While experiencing a higher growth gN' in the steady state.

c)

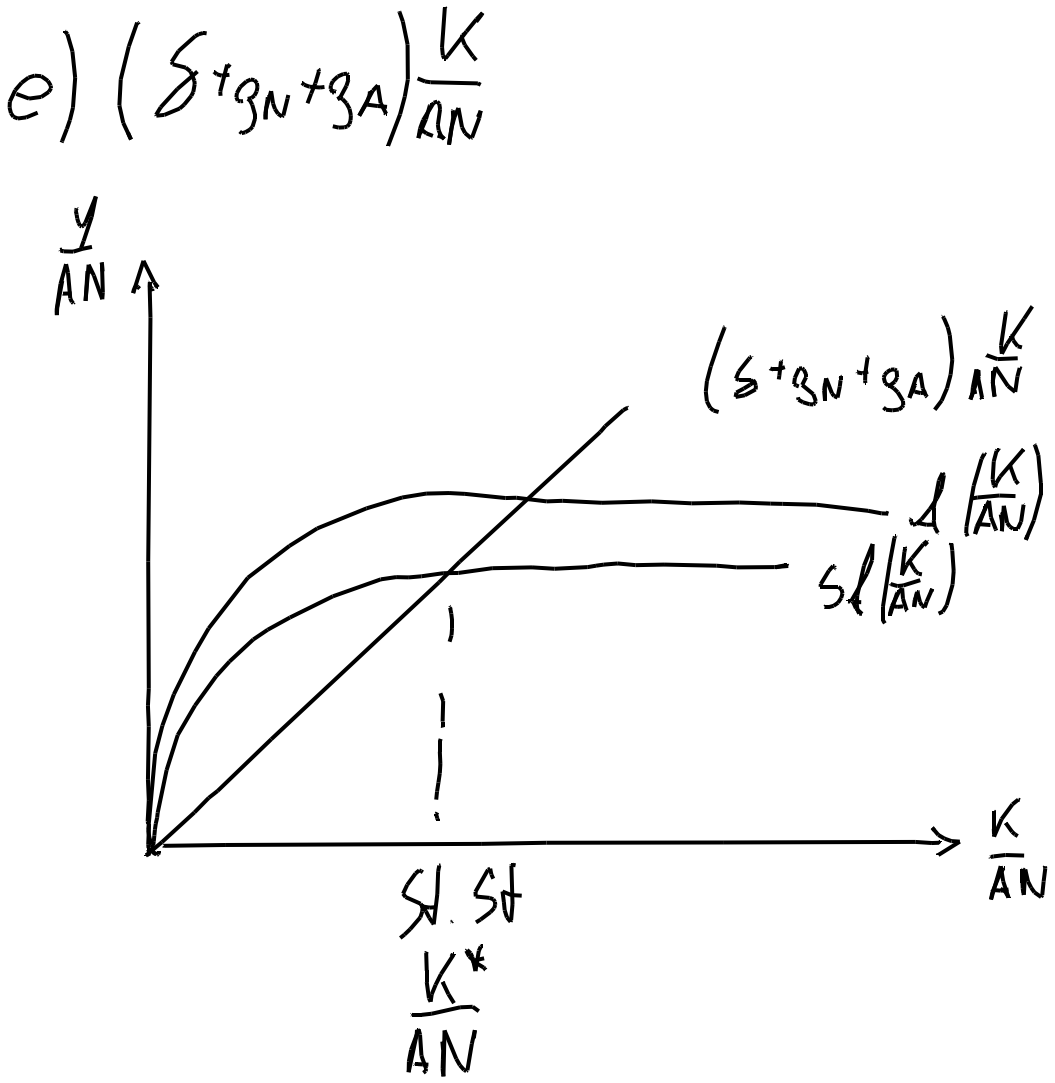


Initially the level of output per worker will have decreased compared to the steady state. Capital will increase at a higher growth rate than at the steady state, as savings are now higher than depreciation, until the steady state is reached once more. Where savings equal depreciation and in the Steady state growth will be equal to gN.

d) According to theory countries with a lower output per worker will move towards a steady state similar to those countries who have already reached the steady state. Meaning the increase in capital per worker is higher for those countries who are not at the steady state. While countries at the steady state per theory experience no growth. This theory builds on countries like Japan and (West) Germany who after world war 2 saw an extremely fast growth rate, catching up to other industrial nations.

This theory however neglects factors like stability, institutions etc. This can be seen when looking at some third world countries and their growth being constant or even negative as their political or geopolitical situation does not allow to reach a steady state at equal levels compared to developed countries. The same goes for differences in the savings or depreciation rate. A rich country might be able to save more and quality of material might lead to a lower rate of depreciation. Which in both cases means that the steady state is at a higher level than for a poor country/less developed country.

e)



At the steady state output per worker and output grow at a rate equal to gN + gA. Growth at the steady state is constant as savings equal depreciation, but considering gN + gA we get that they grow at this rate.