Solutions (Detailed)

Exam (sample)

Macroeconomics

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Group A

1. Nominal GDP (GDP^N)

$$GDP^N_{2017} = 100 \times 5 + 5 \times 100 = 1000$$

$$GDP^N_{2018} = 105 \times 5 + 3 \times 105 = 840$$

Growth rate: $g^N = -16\%$

2.

Paasche

$$IP^P = \frac{105 \times 5 + 3 \times 105}{105 \times 5 + 3 \times 100} = 1.018$$

Laspeyres

$$IP^L = \frac{100 \times 5 + 5 \times 105}{100 \times 5 + 5 \times 100} = 1.025$$

Fisher

$$IP^F = \sqrt{1.018 \times 1.025} = 1.021$$

Real GDP (GDP^R) according to each Index will be given as follows

Real GDP in 2017 will be the same as Nominal GDP 2017, always if we use 2017 as the base year.

Now let's turn to 2018.

$$GDP^R_{2018} = \frac{GDP^N_{2018}}{IP^P} = 825.14$$

$$GDP^R_{2018} = \frac{GDP^N_{2018}}{IP^{Le}} = 819.51$$

$$GDP^R_{2018} = \frac{GDP^N_{2018}}{IP^F} = 822.72$$

3. Now it is easy to calculate the growth rate of Real GDP according to each index

$$g^R_P = -17.48\%$$

$$g^R_{Le} = -18.\%$$

$$g^R_F = 17.7\%$$

4. Measuring Real GDP by using fixed year price indexes leads to two major limitations.

Firstly, we have to update the base from time to time, as it does not make sense to measure GDP at prices of 100 years ago.

Secondly, when we update the base year, we have to re-write the entire history of Real GDP (and other macro-economic components), because it is well known that the growth rate of real GDP between two consecutive periods will be different whether we use year 1 as the base, or year 2 as the base.

Group B

1. In order to obtain the IS function we should just follow the usual steps. After the initial steps we should arrive at

$$\frac{Y_t}{\bar{Y}_t} - 1 = 0.7 + 0.15 + 0.05 - 0.06 + 0.16 - 1 \cdot 2(R_t - \bar{r})$$

$$\tilde{Y}_t = 0\% - 2(R_t - \bar{r}). \quad \text{IS function}$$

If $\bar{r} = 4\%$ and $R_t = 3\%$

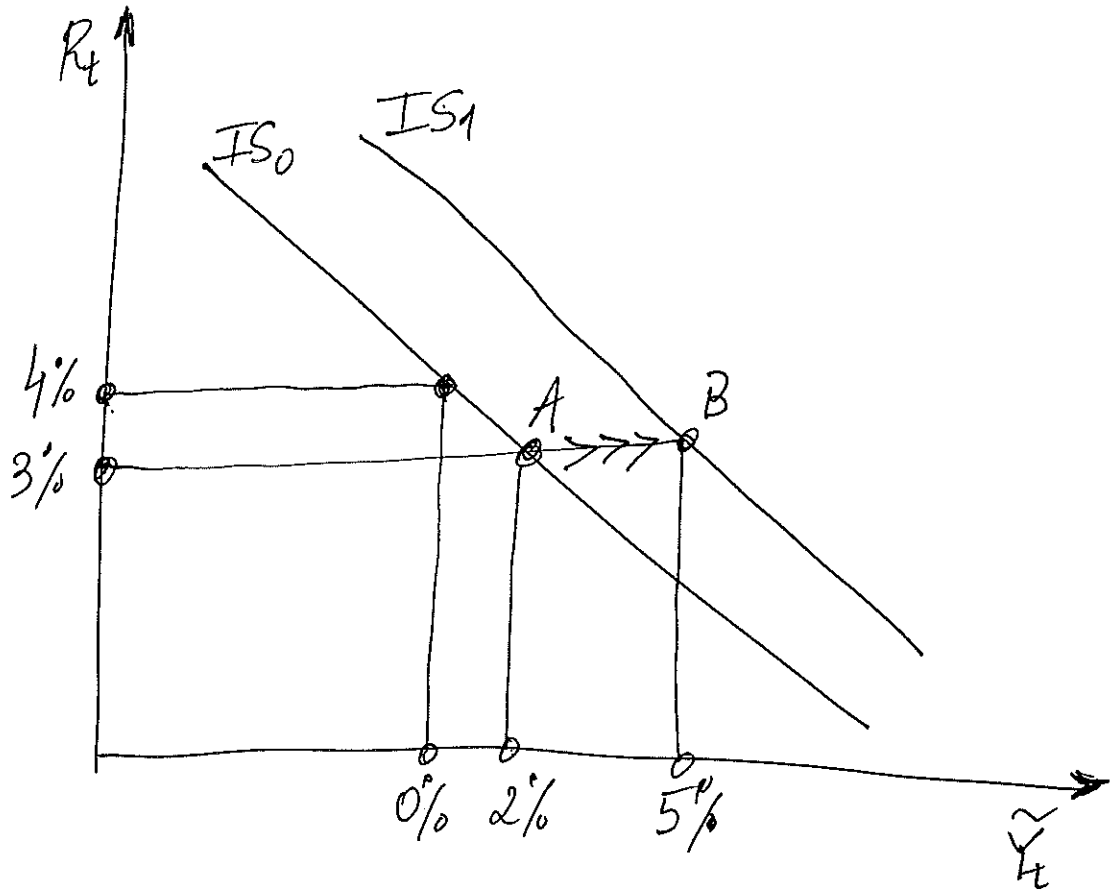
$$\tilde{Y}_t = -2(3\% - 4\%) = +2\% \quad \text{A small boom}$$

2. If $\bar{a}_g$ increases by 3 pp, then

$$\tilde{Y}_t = 3\% - 2(3\% - 4\%) = 5\% : \text{A large boom}$$

See the graphical representation in the next page.

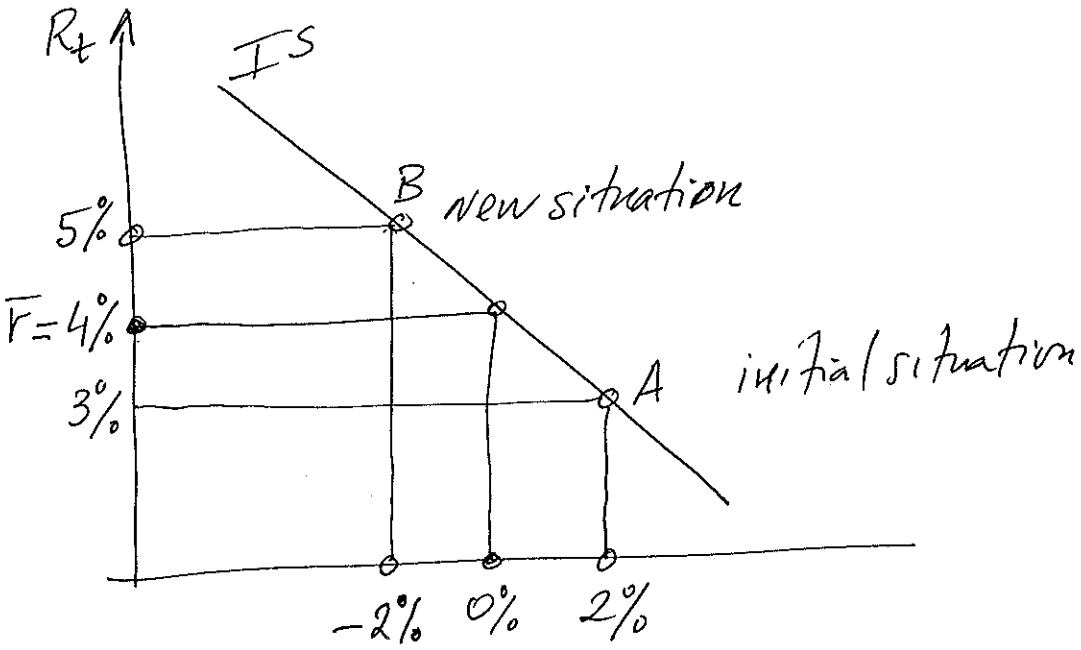
Graphically, this increase can be represented as



3. Taking the initial situation, and having the Central Bank increasing i_t by 2 pp we will have $R_t = i_t - \pi_t \Rightarrow \Delta R_t = \Delta i_t$

$$\tilde{Y}_t = 0\% - 2(5\% - 4\%) = -2\%$$

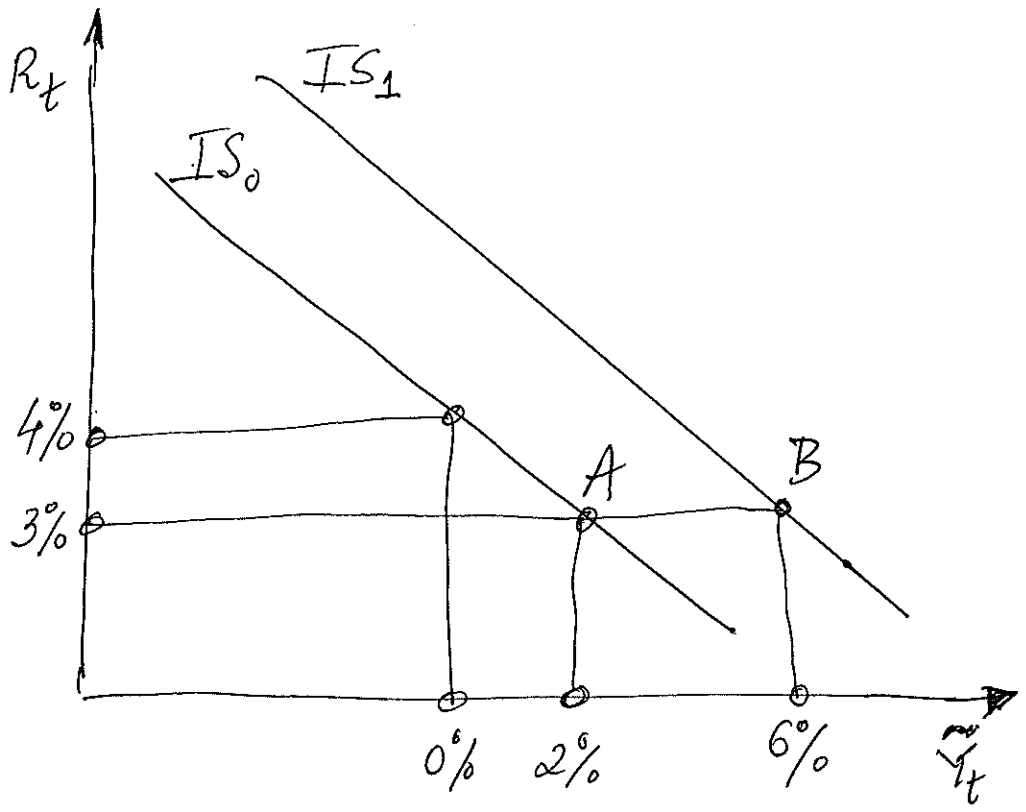
A small recession



4. Now we consider a sharp increase in the marginal productivity of capital: $\bar{r}$ increases

4% → 6%

$$\tilde{Y}_t = 0\% - 2(3\% - 6\%) = +6\%$$ large boom



5. With this new Consumption function, the IS function will be different. Following the same steps again, we will get

$$\tilde{Y}_t = \frac{1}{1-0.5}\left[0\% - 2\left(R_t - \bar{r}\right)\right]$$

Considering that in the initial case we have

$$\bar{r} = 4\%, \quad R_t = 3\% \text{ and now } \Delta\bar{a}_g = 3\,pp$$

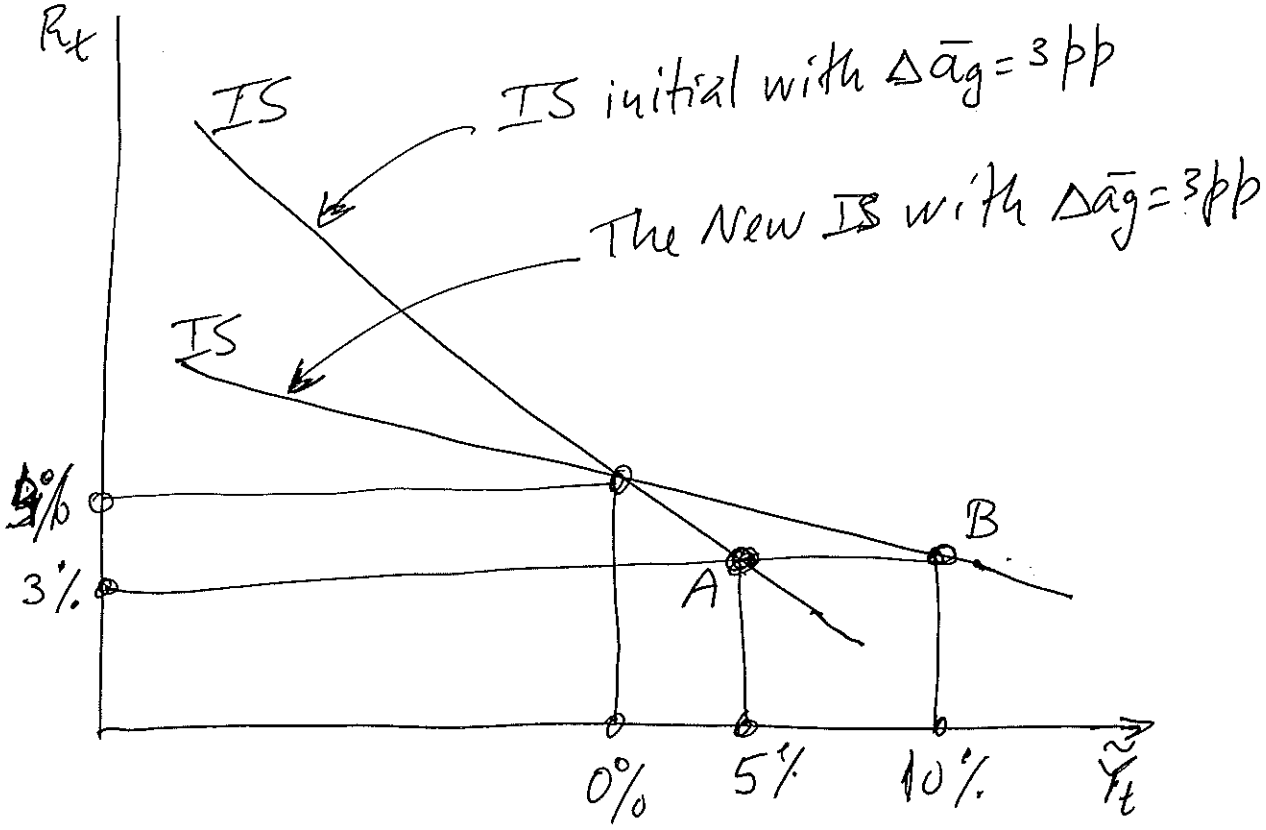
we will have

$$\tilde{Y}_t = \frac{1}{1-0.5}\left[3\% - 2\,(3\% - 4\%)\right]$$

$$= 10\% \;:\; \underline{\text{a huge boom}}$$

Because the multiplier is now equal to $\frac{1}{1-0.5} = 2$; while it was equal to 1 in our previous cases, the same increase in Public spending will lead to a huge boom.

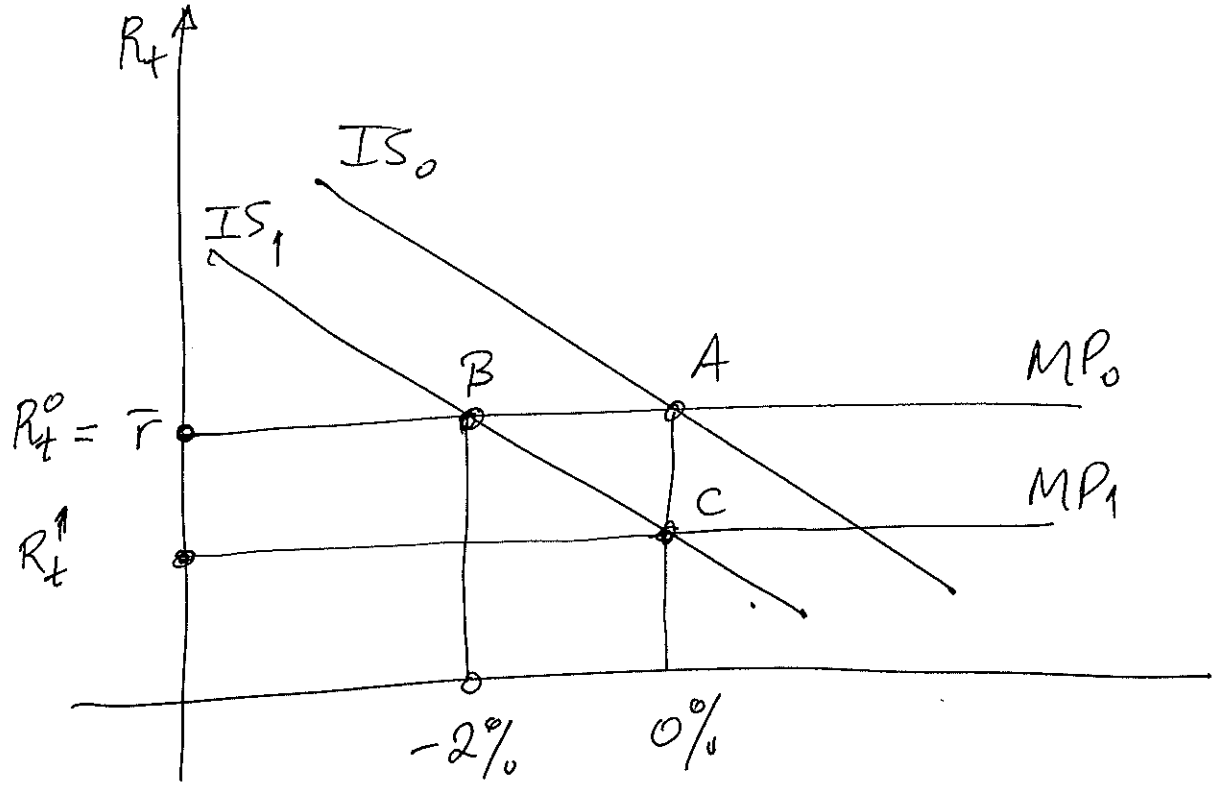
Graphically we get



Group C

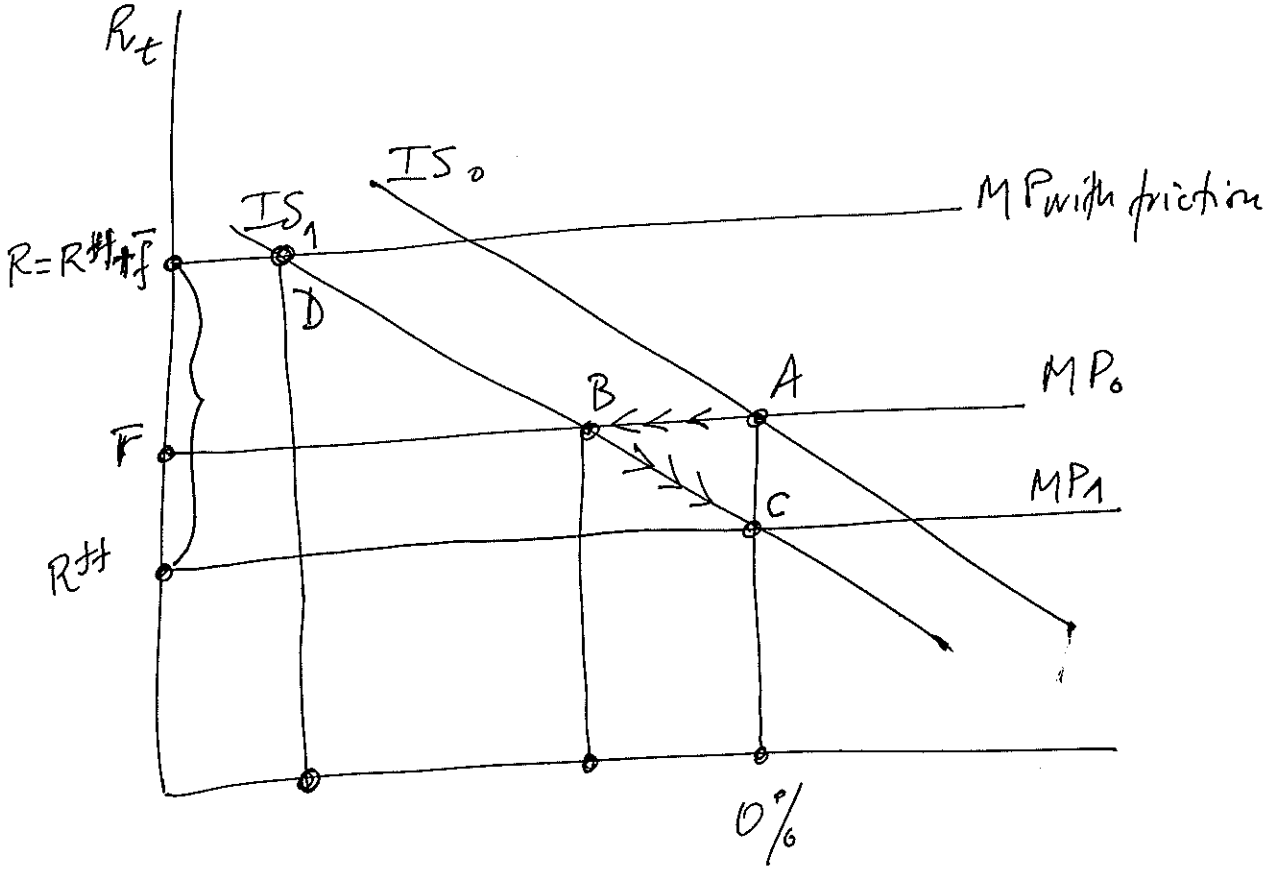
C1

1 A sharp decline in house prices leads to a sharp decline in AD because $\bar{a}_i$ goes down. In order to avoid the recession, the Central Bank will reduce the interest rate (i_t) such that the MP curve will force the economy to go back to $\bar{Y}=0$ as in point C below



2. Financial frictions are an economic factor that distorts "normal" interest rates. Usually, they lead to much higher market real interest rates than those that the central Bank wants to see practiced in the monetary market. Because of high uncertainty and risk, spreads increase dramatically leading to much severe recessions.

3.



As in the question (1) the economy without friction, would move from A to B, and then to C, when the Central Bank reduces its nominal interest rate. The Central Bank desires to have a real interest rate equal to R^{tt}.

However, because of the large spread that is practiced in the Banking sector, the real interest rate ends up being equal to

$$R_t = R^{tt} + \bar{f}$$

$\bar{f}$ ← the spread or the friction

So the Central Bank, if it wants to move the economy to point C, from D will have reduce nominal interest rate by a large amount.

C2

1. Total amount of liabilities = 19000

Equity = 1500

2. Reserve requirements = 5% x 13000 = 650

Capital ratio = 10% x 20500 = 2050

this Bank has liquidity problems because

$$650 > 500$$

and has also solvability problems because

$$2050 > 1500$$

3. The leverage ratio is given by

$$\frac{19000}{1500} = 12,66$$

The level of risk this bank has taken is very high, because with one dollar of equity it created liabilities equal to 12.66 dollars.

4. The New Balance Sheet will be

Assets		Liabilities	
Loans	9600	Deposits	13000
Fin. Invest.	8000	short Run Debt	5000
Cash & Res.	500	Long Term Debt	1000
		Equity	−900
	18100		18100

The bank is bankrupt because it ends up with negative equity. If it does not find very quickly new investors to inject new capital to its balance sheet, it will definitely goes bankrupt.

Group D

1. The AD function is obtained as follows:

$$\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r})$$

$$R_t = \bar{r} + \bar{m}(\pi_t - \bar{\pi})$$

Therefore we get

$$\tilde{Y}_t = \bar{a} - \bar{b}\bar{m}(\pi_t - \bar{\pi}) \quad .$$ the AD function

2. $\bar{a} = 0$, $\bar{r} = 3\%$, $\bar{\pi} = 2\%$, $\bar{o} = 0$

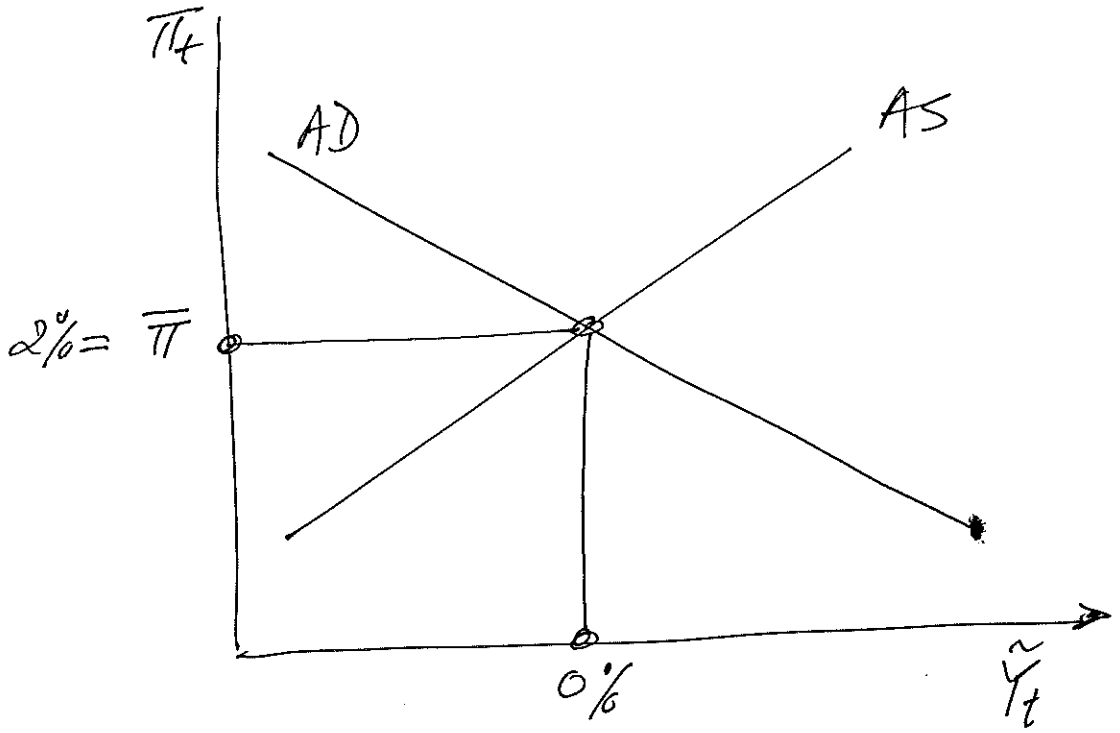
The economy will be equilibrium only when

$$\pi_t = \bar{\pi} \Rightarrow \pi_t = 2\%$$

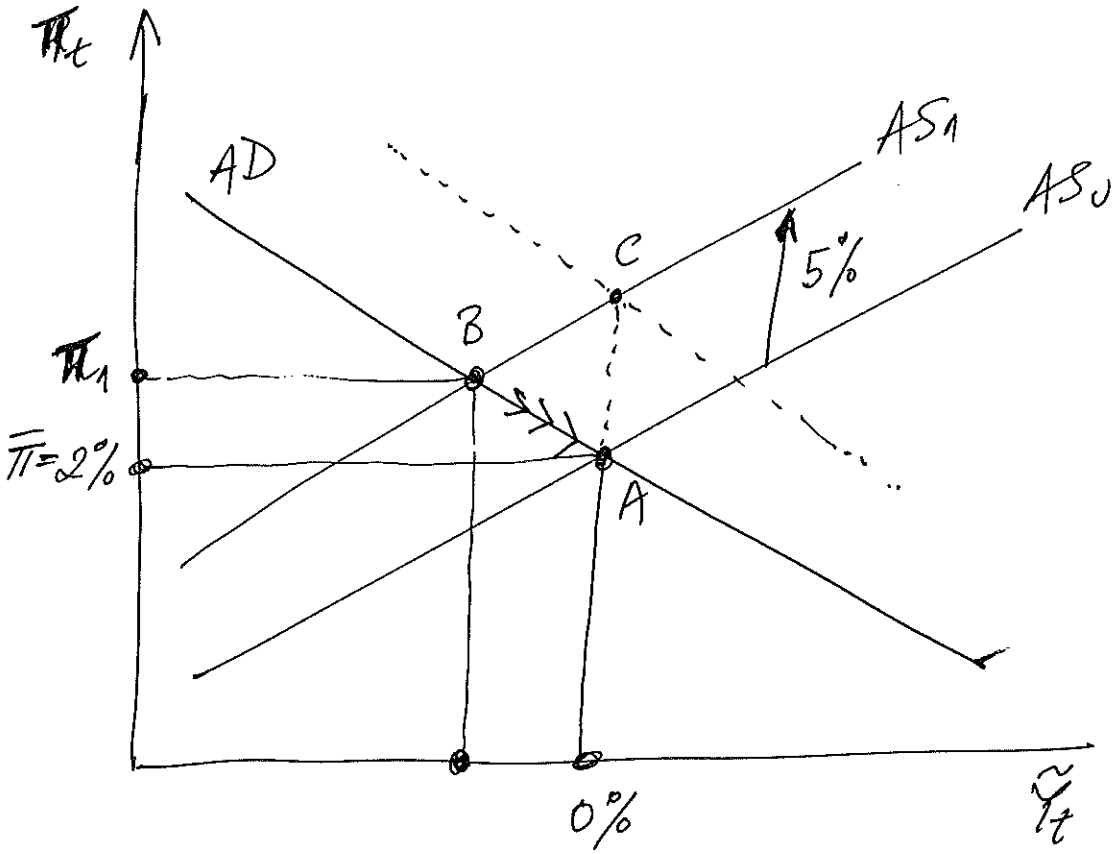
and

$$\tilde{Y}_t = 0 \Rightarrow R_t = \bar{r} = 3\%$$

3. Graphically, the equilibrium will be



4. We will not be able to give a precise value of inflation next period, because we do not have the values for $\bar{\pi}$ and $\bar{b}$. We can surely say that the increase in inflation in the next period will be lower than 5%, because the Aggregate Demand is negatively sloped. See next figure for a more clear view of the problem.



Notice that the economy will not move to C (due to a positive shock of 5% in the AS), instead it moves to B. We can not quantify the value of π_1, because we do not know the values of $\bar{m}$ and $\bar{b}$ (despite knowing $\bar{v}$).

Nevertheless, point B will not be an equilibrium point because the economy is in recession. The Central Bank will not react by lowering interest rates, as this move would create even more inflation (think as if lower interest rates would lead to dashed AD curve) at point C.

As the Central Bank does not react, at B the economy is in recession and then inflation will start gradually to go down (the AS curve will shift downwards) until it reaches the initial level of $\pi_t = \bar{\pi} = 2\%$
This process is emphasised by the arrows from B to A.