MCQ

1.	A
2.	C
3.	D
4.	C
5.	C
6.	C
7.	C
8.	B
9.	E
10.	C
11.	C
12.	D
13.	A
14.	E
15.	B
16.	B
17.	D
18.	D
19.	C
20.	B
21.	D
22.	A
23.	C
24.	D
25.	A
26.	B
27.	D
28.	C
29.	B
30.	B

Question 1:

a.

We calculate the cumulative cash flow until the project's sum ≥ 0:

In below table, the green cell's mark the given project's payback period (the rest of project C's cash flows have been excluded as they are not relevant for the calculation of the payback period):

	Time (years)											
Project	-	1	2	3	4	5	6	7	8	9	10	11
A	- 1.000	400	565	730	- 35	- 35	- 35	- 35	- 35	- 35	- 35	- 35
B	- 1.000	- 200	- 30	140	310	310	310	310	310	310	310	310
C	- 1.000	- 940	- 880	- 820	- 760	- 640	- 520	- 400	- 280	- 160	- 40	80

Project A = 1 year

Project B = 3 years

Project C = 11 years (-1000 + 60 * 4 + 120 * 7 = 80)

b.

$$NPV_A = \frac{-1{,}000}{(1+0.09^0)} + \frac{1{,}400}{(1+0.09^1)} + \frac{165}{(1+0.09^2)} + \frac{165}{(1+0.09^3)} + \frac{-765}{(1+0.09^4)} = \mathbf{8.75}$$

$$NPV_B = \frac{-1{,}000}{(1+0.09^0)} + \frac{800}{(1+0.09^1)} + \frac{170}{(1+0.09^2)} + \frac{170}{(1+0.09^3)} + \frac{170}{(1+0.09^4)} = \mathbf{128.73}$$

$$NPV_C = \frac{-1{,}000}{(1+0.09^0)} + \frac{60}{(1+0.09^1)} + \frac{60}{(1+0.09^2)} + \frac{60}{(1+0.09^3)} + \frac{60}{(1+0.09^4)} + \frac{\frac{120}{0.09}}{(1+0.09^4)}$$
$$= -1{,}000 + 194{,}38 + 944.57 = \mathbf{138.95}$$

c.

In order to consider, the change in the cash flow, we will instead be utilizing the annuity formula for the 36-year annuity and replace the 60 per year cash flows with an annuity, to make things more simple:

$$NPV_C = \frac{-1{,}000}{(1+0.09^0)} + 60\left[\frac{1}{0.09} - \frac{1}{0.09 * 1.09^4}\right] + \frac{120\left[\frac{1}{0.09} - \frac{1}{0.09 * 1.09^{36}}\right]}{1.09^4} =$$
$$= -1{,}000 + 194{,}38 + 902.12 = \mathbf{96.50}$$

The first annuity is to the power of 4 as it includes period 1-4.

The second annuity is to the power of 36 as it accounts for the cash flows in period 5-40. It is discounted to the power of 4 because the annuity calculates the PV in t = 4, and we want it to be PV in t = 0.

Calculating how the change in project c's cash flows affect the NPV it is clear that the effect is relatively small. The reason is that the most of the value stems from the relatively near future cash flows, with the nominal cash flows of 120 becoming increasingly smaller in PV terms due to the discount rate of 0.09 = 9%.

d.

	NPV	**IRR**
Project B	128,73	17,351%
Project C	138,95	10,085%

In the above table, it is clear that project B's IRR > project C's IRR. Following the IRR rule, the project with the highest IRR should be chosen. However, the primary decision criteria shall be NPV unless one is capital constrained, in which IRR shall still not be the deciding parameter. Therefore, project C should be chosen over project B, as project C's NPV > project B's NPV.

e.

In the scenario where there are no capital constraints, only project rationing, project C shall be undertaken due to it having the highest NPV. If there were capital constraints, one could instead look at the profitability index. However, this would yield the same conclusion, as all projects have the same initial investment size. Finally, if I needed my money back quickly, project A or B could be considered due to their short payback periods, 1 and 3 years respectively.

Question 2:

a.

DDDD expects to receive a cash flow of 2,500 Euros in real terms indefinitely, starting next year. We can therefore treat the calculation as a perpetuity. The CFO mistakenly calculated the perpetuity in nominal terms while the cash flow is expected to be 2,500 in real terms. One must be careful to always discount real cash flows by the real discount rate or discount nominal cash flows by the nominal discount rate.

CFO's calculation:

$$PV = \frac{C}{r} = \frac{2{,}500}{0.25} = 10{,}000$$

The CFO should instead have calculated the perpetuity by using the real interest rate rather than the nominal interest rate:

$$Inflation_{IT} = 0.06 = 6\%$$
$$Nominal\ interest\ rate = 0.25 = 25\%$$
$$1 + real\ interest\ rate = \frac{1 + nominal\ interest\ rate}{1 + inflation\ rate}$$
$$1 + real\ interest\ rate = \frac{1.25}{1.06}$$
$$real\ interest\ rate = 0.1792 = 17.92\%$$

$$PV = \frac{C}{r} = \frac{2{,}500}{0.1792} = 13{,}947.37$$
$$13{,}947.37 - Investment = 13{,}947.37 - 10{,}000 = \mathbf{3{,}947.37}$$

b.

Projects shall never be undertaken if they rely on exchange rate speculation. Assuming, that it is a sure thing that the DKK will appreciate against the EUR, the DKK cash flows will be relatively lower as an appreciation of the DKK against the EUR means that more Euros are needed to give the same DKK cash flows. We can thus conclude that if the DKK appreciates against the EUR, then the translation of the EUR cash flows into DKK cash flows will give lower DKK cash flows.

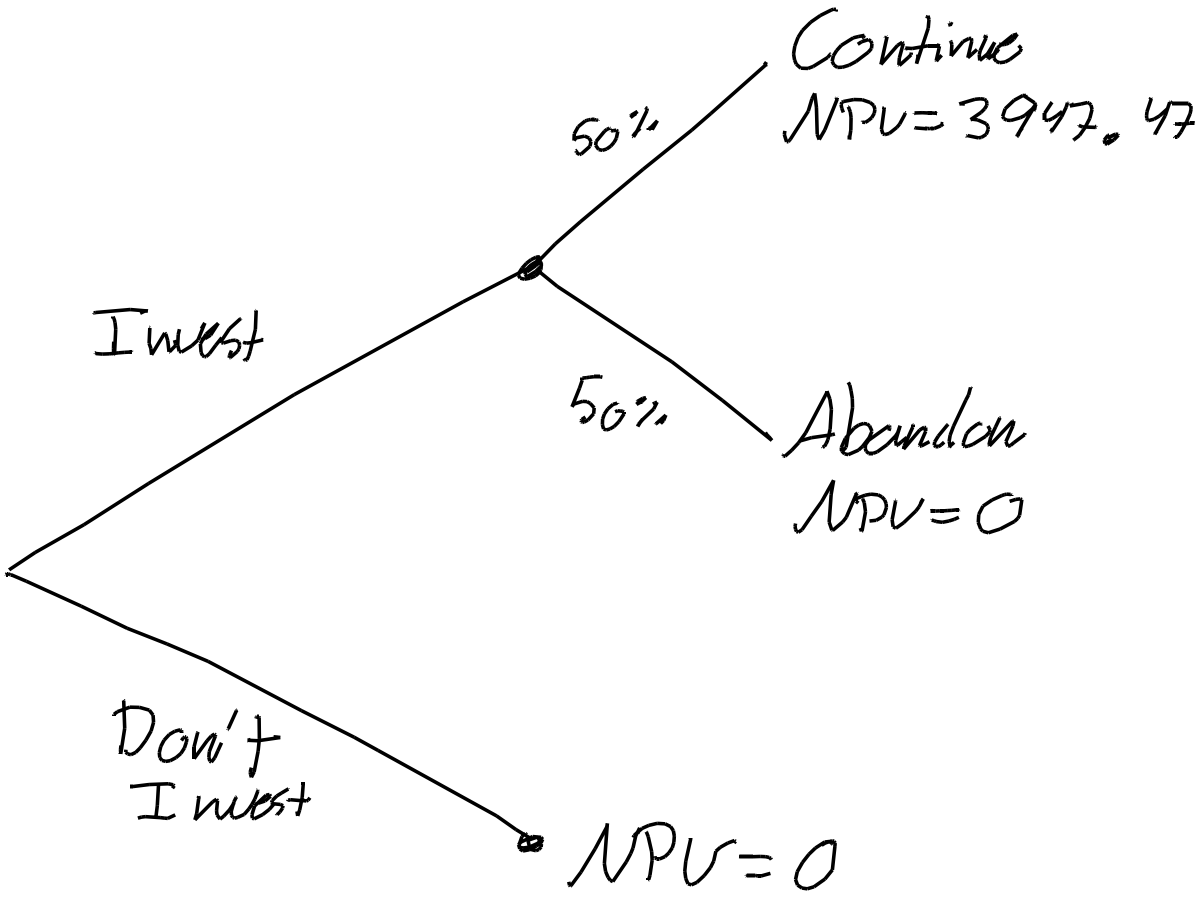
Assuming that the EUR cash flows are not affected by exchange rates, purchases and sales happen in EUR, then an appreciation of the DKK against the EUR will not affect the EUR cash flows.

c.

Disclaimer: the following answer assumes that the assignments text stating "*that they will be no positive Euro cash flow in future year*" is supposed to stay "*in future **years***". Otherwise, if it means that the positive cash flows are only foregone in one year and then continued, it would change the below answer.

Real options create value for shareholders due to the uncertainty of the future. Management can accordingly act in accordance with the developing environment in order to maximize shareholder value.

Assuming that this depends on a one-off decision to enact or not enact the new legislation, the decision-tree can be illustrated accordingly:



If it is not a one-off decision, then each period would include the "Continue"- vs. "Abandon"-decision where the "Abandon"-decision would give the company back the investment.

The new NPV of the project would be calculated based on the probability of each scenario:

$$NPV_{w.\ real\ option} = \%_{Continue} * NPV_{Continue} + \%_{Abandon} * NPV_{Abandon}$$
$$50\% * 3{,}947.47 + 50\% * 0 = 1{,}973.74$$

In a scenario where the 10,000 EUR investment is a sunk cost can be calculated similarly, with the adjustment that $NPV_{Abandon} = -10{,}000$

$$NPV_{w.o.\ real\ option} = \%_{Continue} * NPV_{Continue} + \%_{Abandon} * NPV_{Abandon}$$
$$= 50\% * 3{,}947.47 + 50\% * -10{,}000 = -3{,}026.27$$

In the scenario where the decision to enact the legislation is a one-off decision, the value of the abandonment option is accordingly:

$$1{,}973.74 - (-3{,}026.27) = 5{,}000$$

d.

Firstly, capital must flow unimpeded across national borders, as real interest rates will come to be the same across borders: international fisher effect. Secondly, the company must consider whether they are using the global CAPM or the local CAPM. Often, local beta will be larger than the global beta, as systematic risk can be diversified away to a greater extent globally. Therefore, if the company uses the real discount rate to discount its project, which are the same across borders, and ensures that the right beta is used the firm can use the same real discount rate to both the local and foreign investment. Usually, the right CAPM to be used is the global CAPM as cost of capital is more likely to be determined globally rather than locally.