ECONOMICS 1 (sem 2)

Tutorial 7

Diego Battiston
https://diegobattiston.github.io

You can download these slides from

https://diegobattiston.github.io/T7.pdf

Questions to cover today

- Q7
- Q8
- Q10
- Q18
- Q19
- Q22
- Q23

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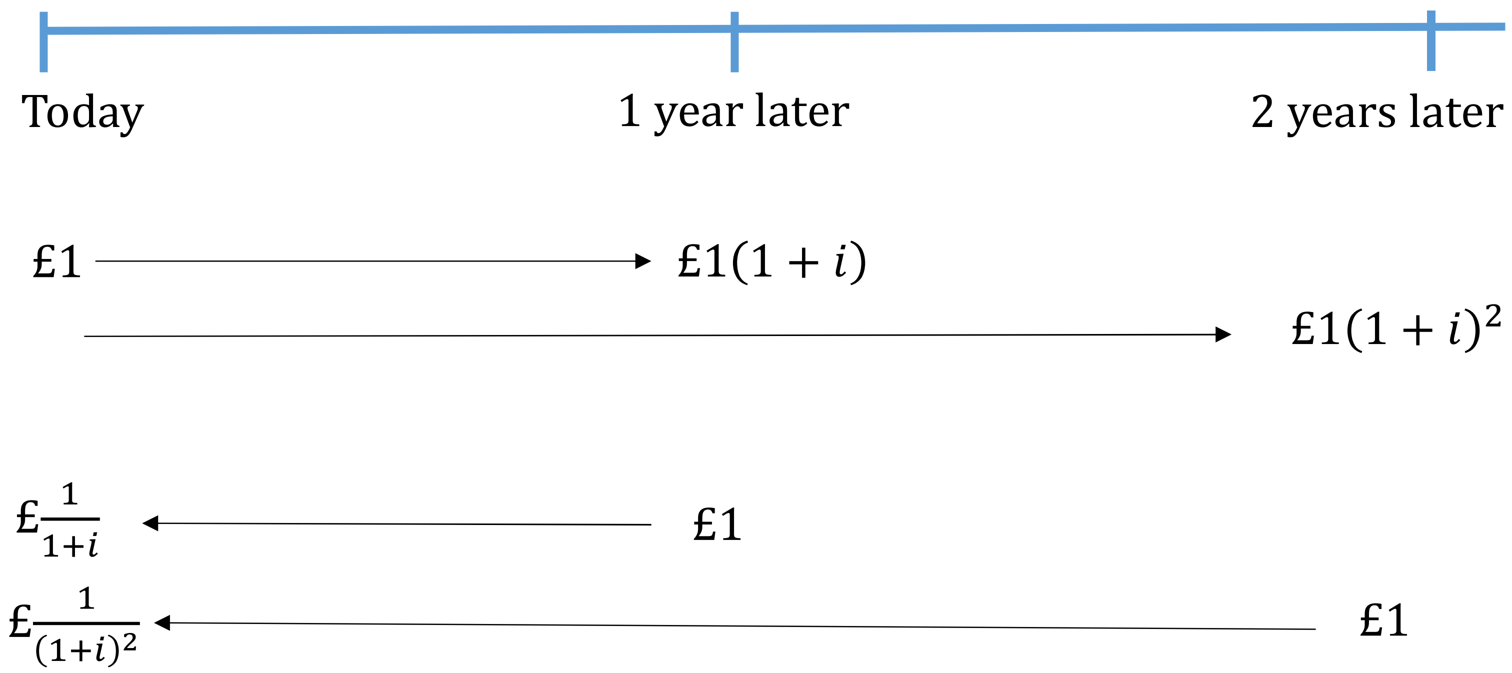
Question 7

Suppose you know you will receive £50,000 in one year from now. What is the present value of £50,000 if the annual rate of interest is: 8%, 10%,12%



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Question 7

Suppose you know you will receive £50,000 in one year from now. What is the present value of £50,000 if the annual rate of interest is: 8%, 10%,12%

$$\frac{£50{,}000}{(1+0.08)} = £46{,}296$$

$$\frac{£50{,}000}{(1+0.1)} = £45{,}455$$

Etc.

Question 8

You want to build a hut. Can use different materials that have different price and depreciate differently:

- Brick: £3,500 (10% depreciation)
- Wood: £3,000 (15% depreciation)
- Straw: £2,500 (20% depreciation)

Which should you use if interest rate is 5%

Cost of capital = Interest + Depreciation

Either you get a loan at 5% or your cost of opportunity is to use this money into something that yields 5%

You need to add some money to keep the same initial value

Question 8

You want to build a hut. Can use different materials that have different price and depreciate differently:

- Brick: £3,500 (10% depreciation)
- Wood: £3,000 (15% depreciation)
- Straw: £2,500 (20% depreciation)

Which should you use if interest rate is 5%

- Annual Cost of Brick: $\pounds 3{,}500\ (0.05 + 0.1) \quad = \quad \pounds 525$
- Annual Cost of Wood: $\pounds 3{,}000\ (0.05 + 0.15) \quad = \quad \pounds 600$
- Annual Cost of Straw: $\pounds 2{,}500\ (0.05 + 0.2) \quad = \quad \pounds 625$

Question 10

Kathy earns €55,000 today and will earn €60,000 in the future

Maximum interest rate that would allow her to spend €105,000 today?

Minimum interest rate that would allow her to spend €120,500 in the future?

- Max consumption today $= \text{€}55 + \frac{\text{€}60}{1+i} = \text{€}105$

$$\Longrightarrow \quad i = 0.2$$

- Max consumption tomorrow $= \text{€}55(1+i) + \text{€}60 = \text{€}120$

$$\Longrightarrow \quad i = 0.21$$

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Question 18

Gudrun lives in a world with two periods.

Income in each period is 210 and interest rate is $i = 0.05$

a) What is the present value of Gudrun's lifetime income? Draw Intertemporal Budget Constraint for $i = 0.05$ and $i = 0.2$

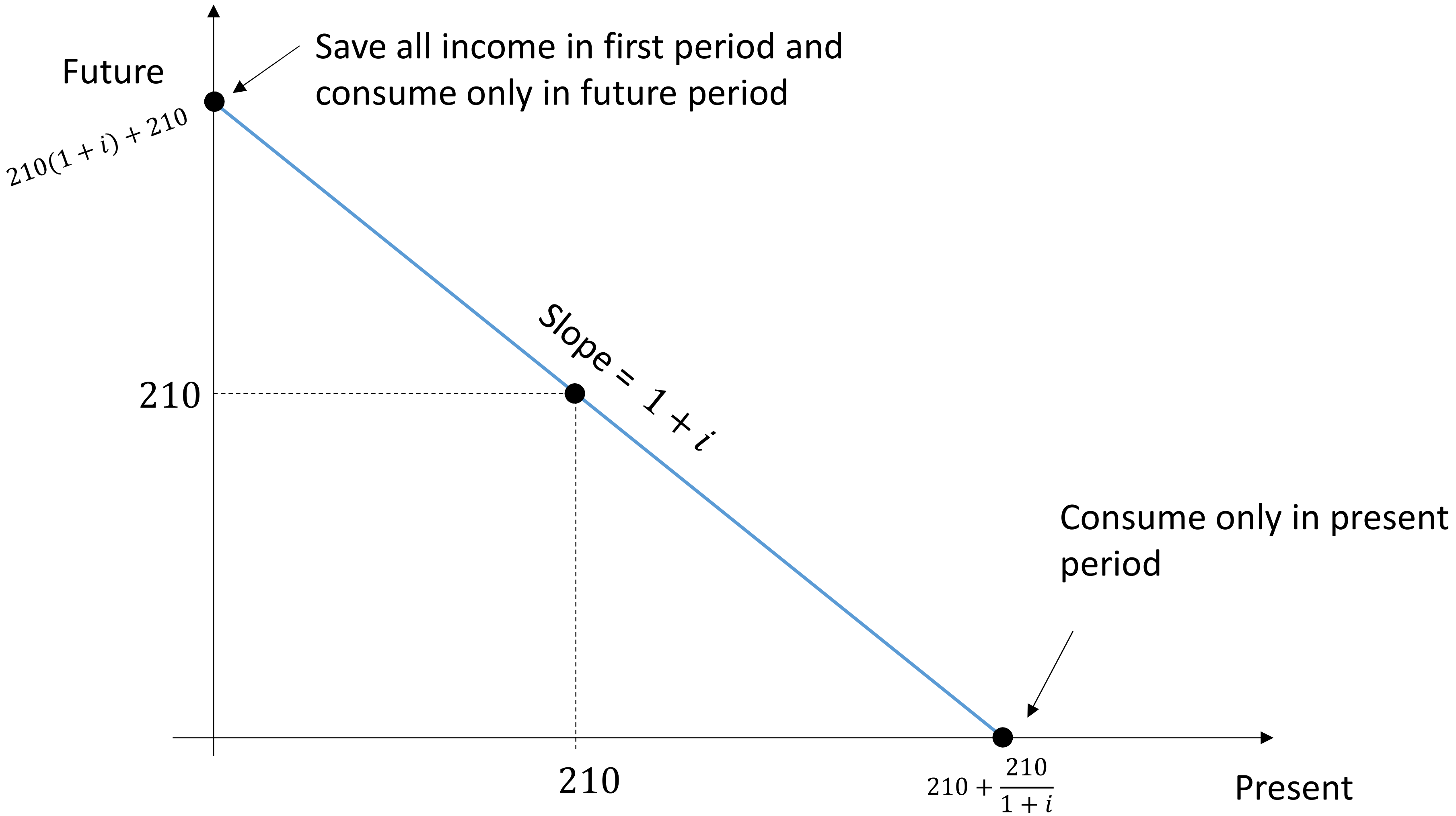
Intertemporal Budget Constraint

- Income present period = 210
- Income future period $= 210$
- Maximum that can consume today = $210 + \frac{210}{1+i}$
- Maximum that can consume in the future = $210(1 + i) + 210$

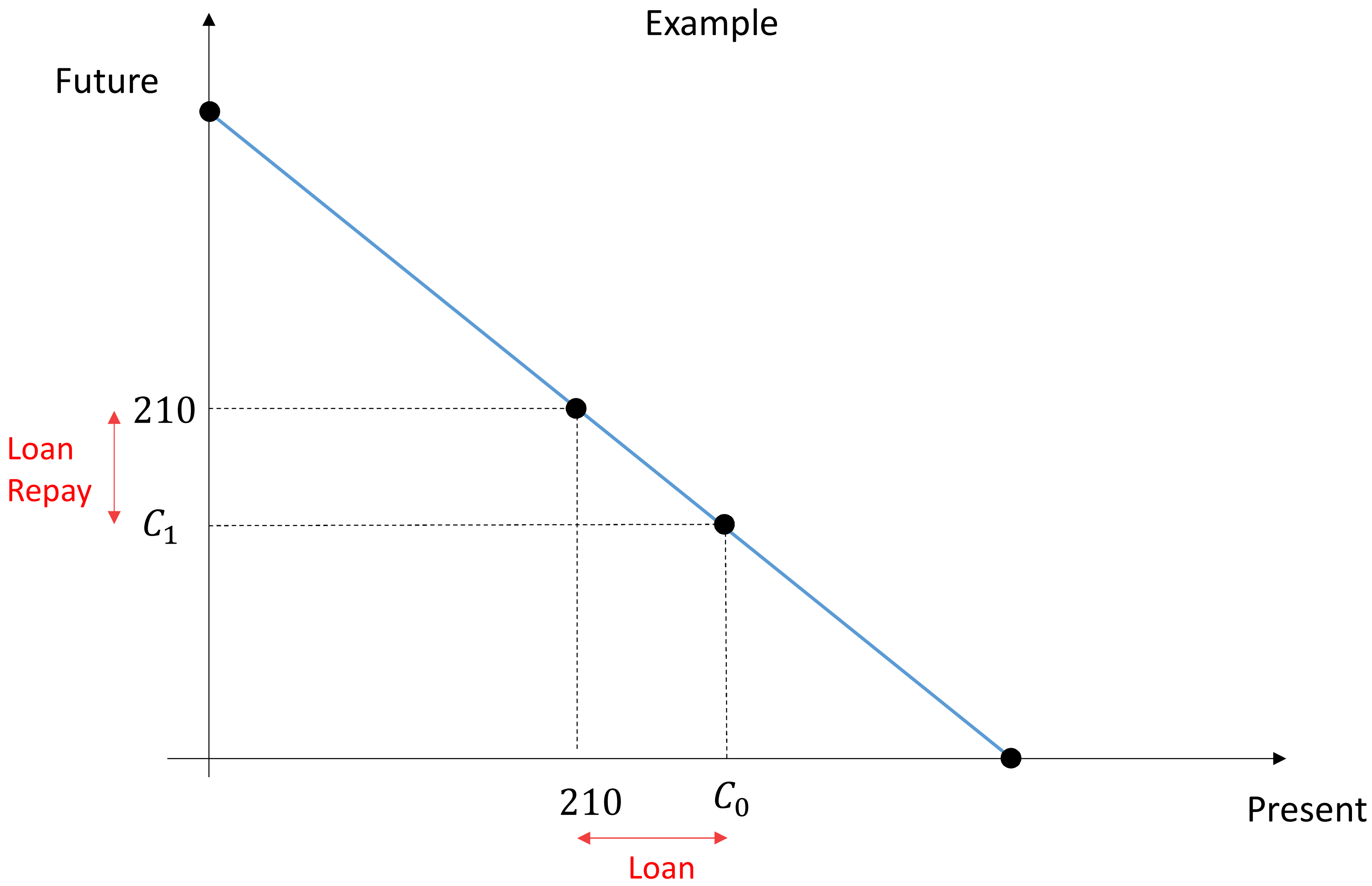
Key:

If you consume £1 less today (you save) you can consume £$(1 + i)$ more in the future

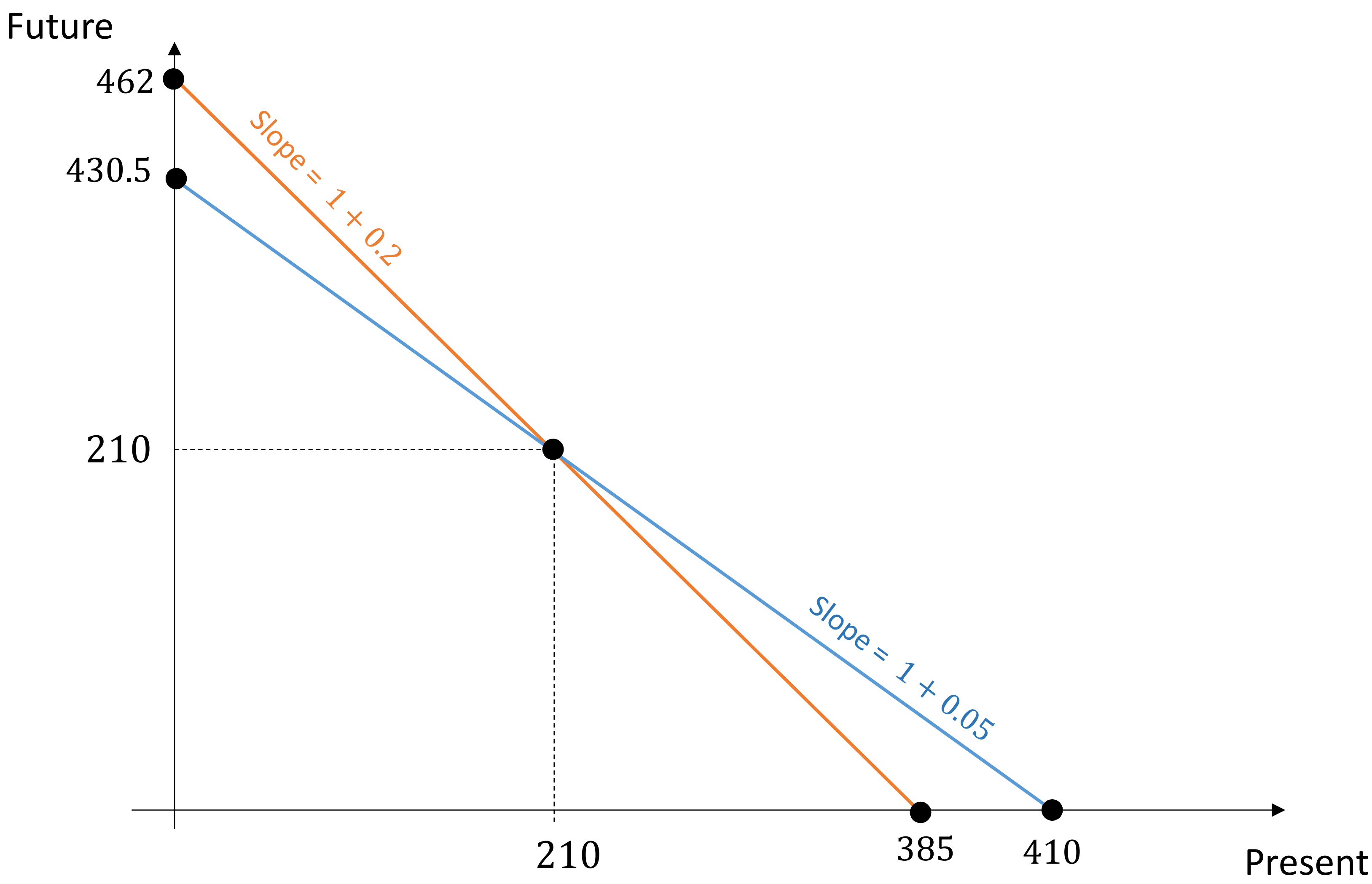
Intertemporal Budget Constraint



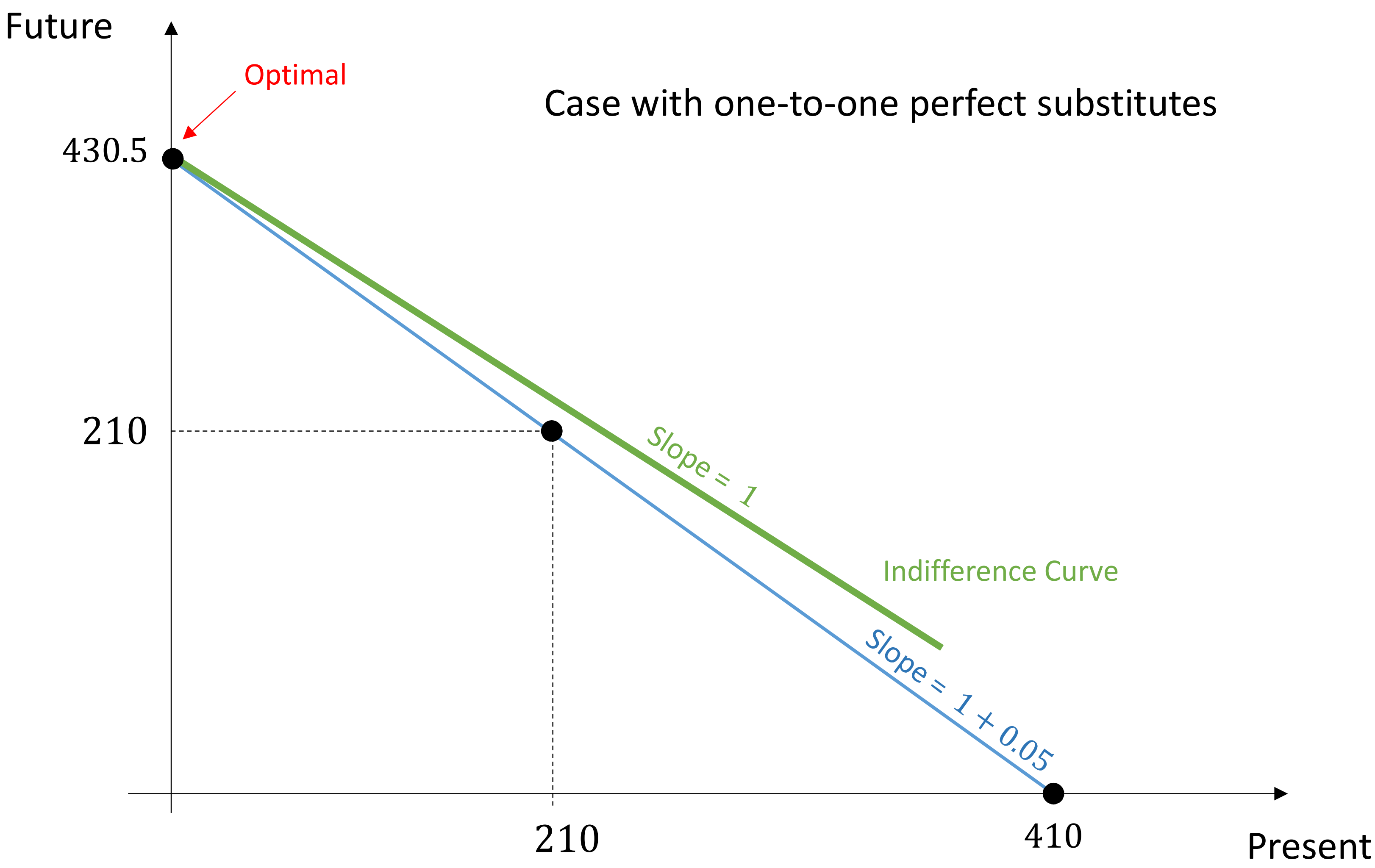
Intertemporal Budget Constraint



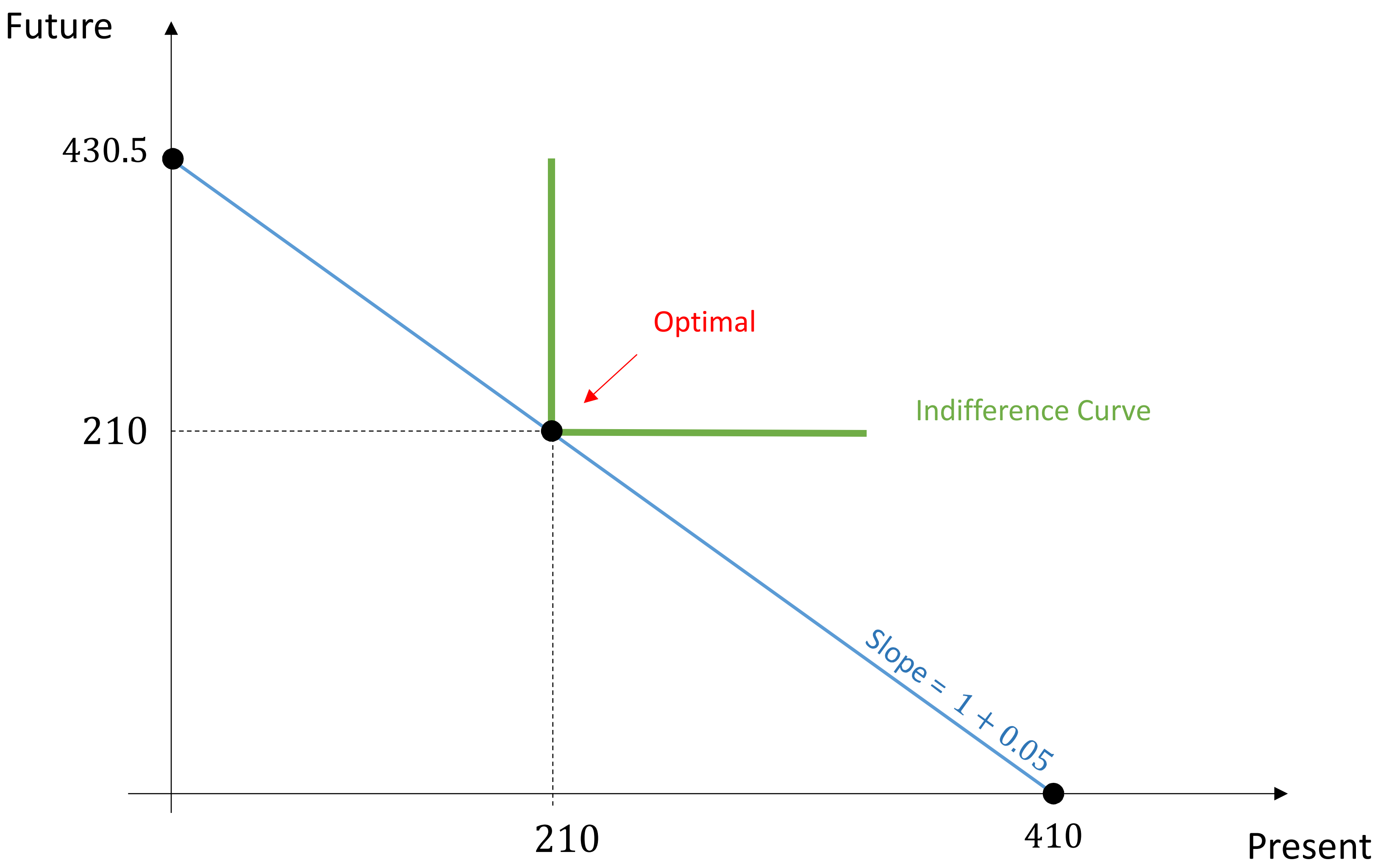
Solution part a



b) Preferences for present and future consumption are one-for-one substitutes



c) Preferences for present and future consumption are one-for-one complements

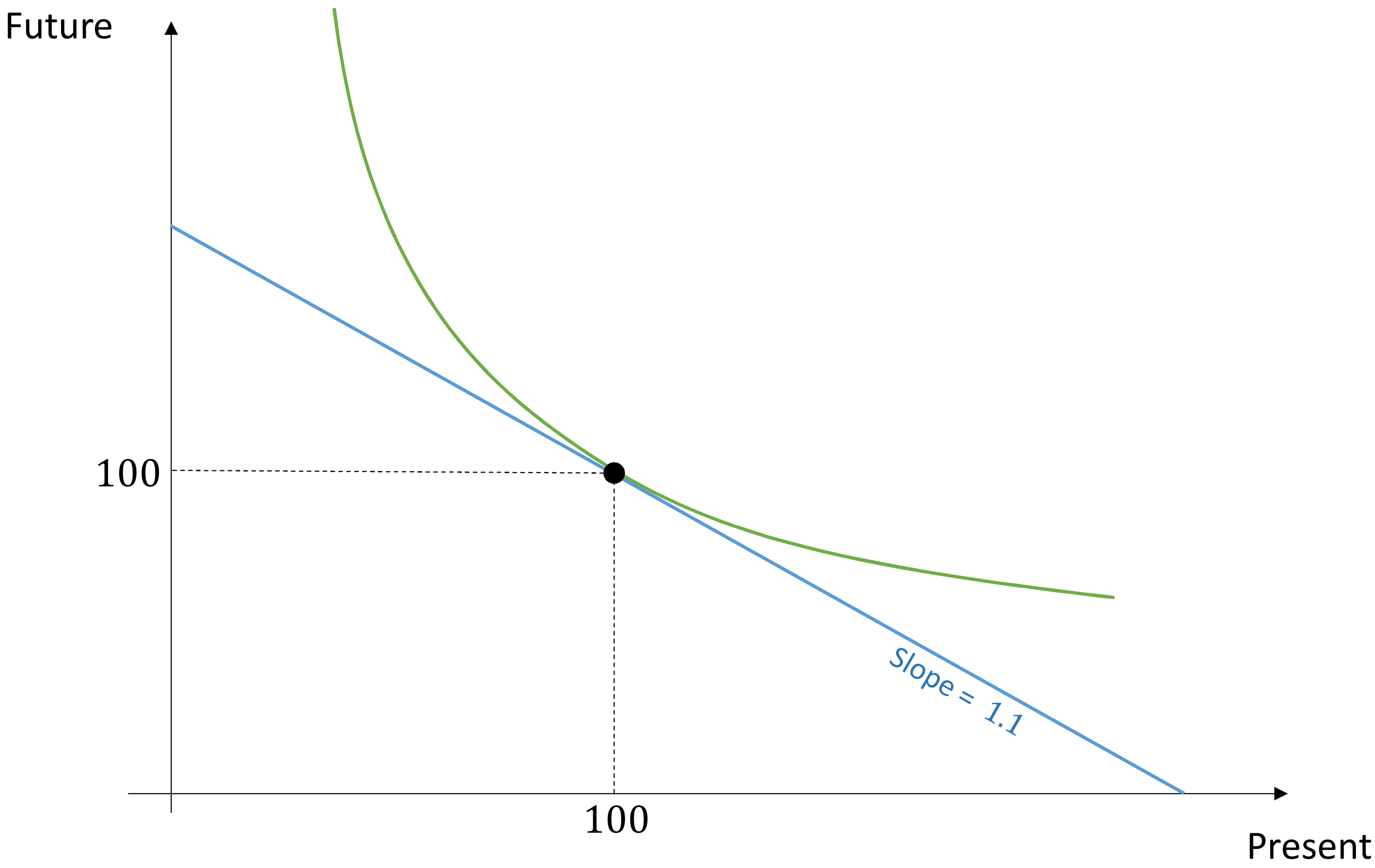


Question 19

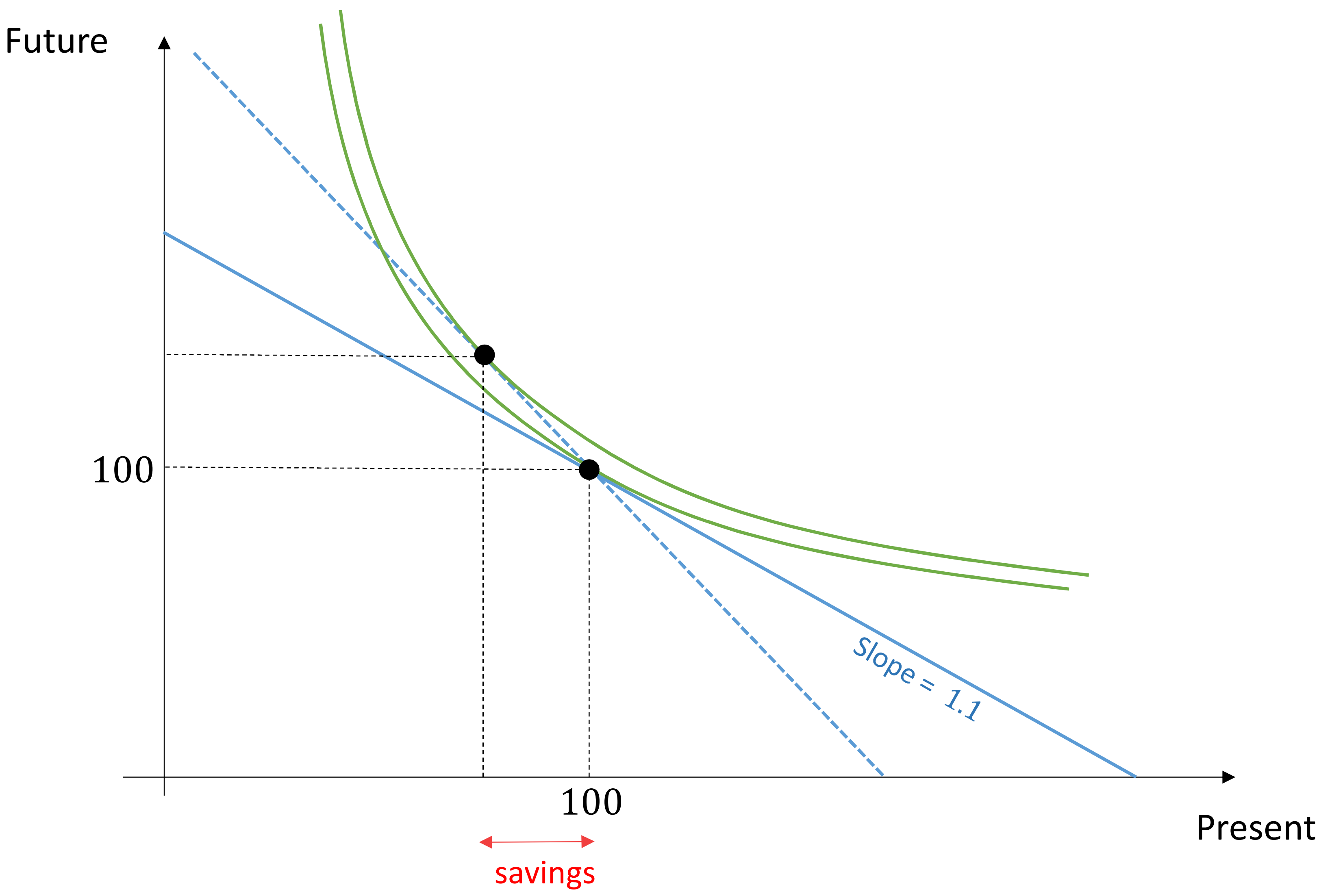
- Smith receives €100 of income this period and €100 next period.
- At $i = 10\%$ he consumes all his current income in each period.
- Diminishing marginal rate of preference between present/future consumption

True or false: If i rises to 20%, Smith will save some of his income this period

Initial Situation



Interest Rate Increase



Question 22

- A scarce resource, facing a constant demand, will be exhausted in 10 years
- An alternative resource will be available (in 10 years) at a price of $100
- **What must the price of the resource be today if the interest rate is 10%?**

- The price increases at the interest rate
  - If grows at a lower rate, price today should go down
  - If grows at a higher rate, the high demand will increase price today
- In 10 years, the price must be $100
  - If price is higher, people will prefer to buy the new resource the last period
  - If price is lower, there will be a high demand the last period

$$P_0(1.1)^{10} = 100 \quad \Longrightarrow \quad P_0 = \$38.55$$

Question 23

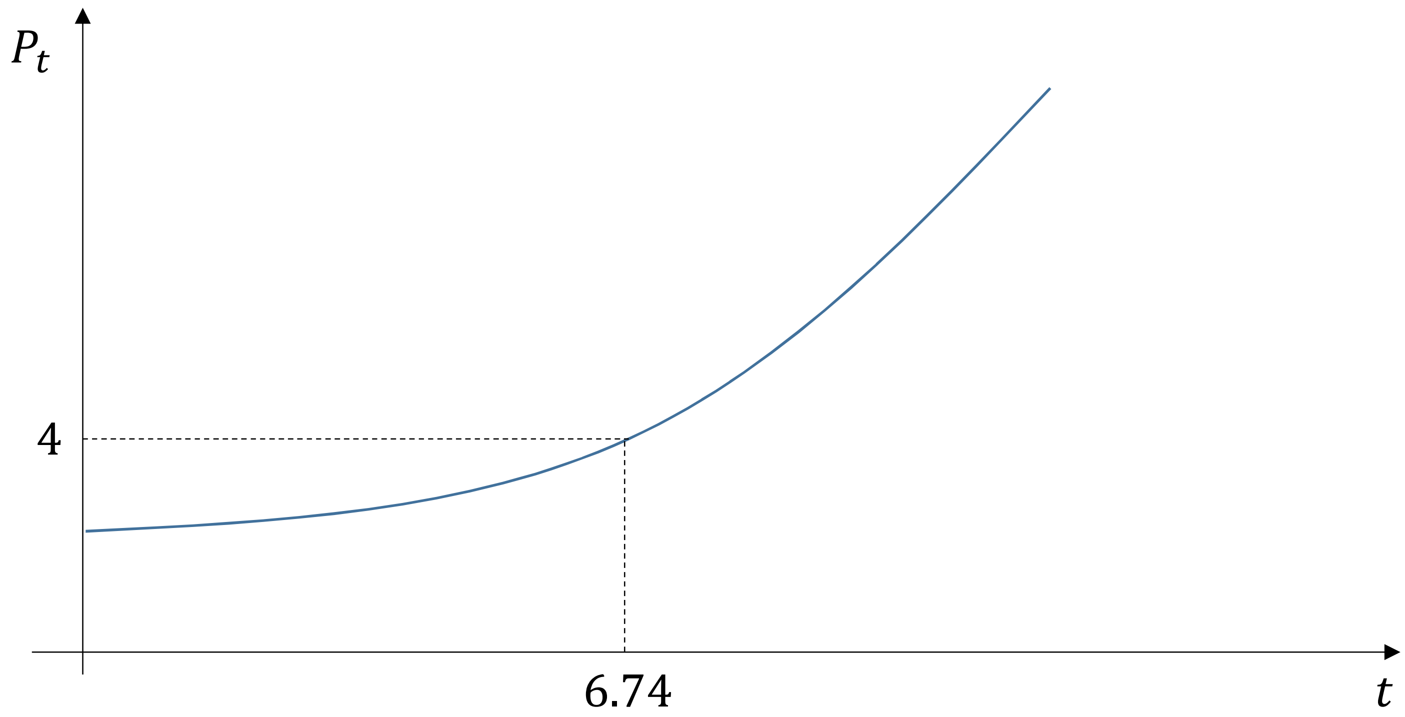
- MC solar energy = 4
- MC coal energy = 3.5
- Coal will last 100 years at current use
- Interest rate = 2%

What do you expect to happen with the current price of coal?

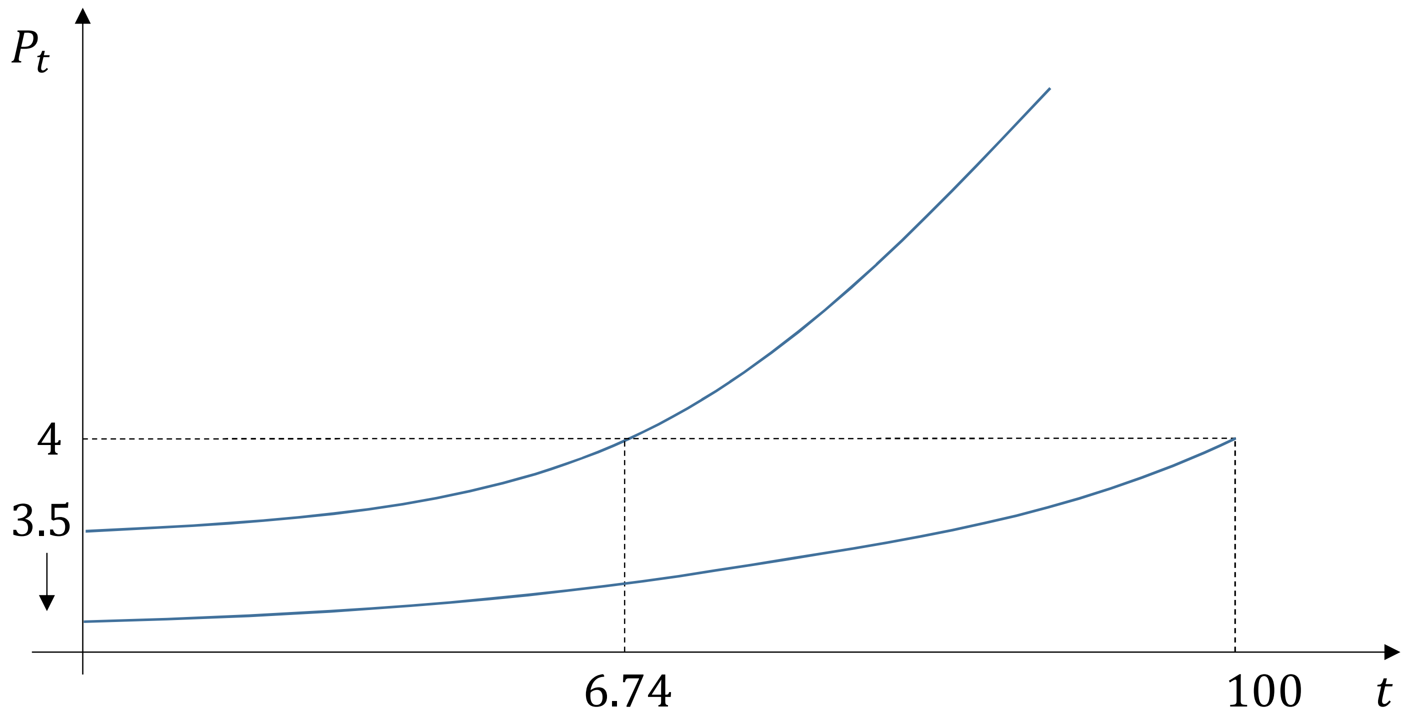
- Coal, similar to oil, gold, etc. are scarse assets used to store value.
- Then, its price should evolve approx. at the interest rate (and so the MC of coal energy)
- Solar energy is unlimited and its price is constant at its current MC

- Calculate the evolution of coal price (i.e. MC of coal energy)

$$P_t = 3.5(1.02)^t$$



- This is a problem and can't be equilibrium
- When $P_t = 4$ there is still 96 years of coal available
- Price of coal will not increase above 4 (why?)
- P_0 should adjust downwards as people tries to sell coal today



$$4 = P_0(1.02)^{100} \implies P_0 = 0.55$$

- Alternatively, usage of coil should increase