

School of Business

## WRITTEN EXAMINATION

Course Corporate Finance Management

Sub-course

Course code NA308G

Credits for written examination 5 hp

Date 2026-05-13

Examination time 14.15-19.30

Examination responsible Hans Mörner

Teachers concerned Hans Mörner

Aid at the exam/appendices

Your calculator

Other

- Instructions
- Take a new sheet of paper for each teacher.
  - Take a new sheet of paper when starting a new question.
  - Write only on one side of the paper.
  - Write your name and personal ID No. on all pages you hand in.
  - Use page numbering.
  - Don't use a red pen.
  - Mark answered questions with a cross on the cover sheet.

### Grade points

A	55-60	B	49-54
C	43-48	D	37-42
E	30-36	F	0-29

**Examination results should be made public within 18 working days**

*Good luck!*



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**Question 1**

**15 marks**

- a) Explain what we mean by term structure of interest rates?
- b) Explain the payback model and the problems with the method.
- c) What is Salvage value?
- d) What is the difference between systematic risk and unsystematic risk?
- e) The net present value method is not affected by the company's choice of accounting method. What do we mean by that?

**Question 2**

**15 marks**

Executive Cheese has issued debt with a market value of 100 million and has outstanding 15 million shares with a market price of 10 a share. It now announces that it intends to issue a further 60 million of debt and to use the proceeds to buy back common stock. Debtholders, seeing the extra risk, mark the value of the existing debt down to 70 million.

- a) How is the market price of the stock affected by the announcement and how many shares can the company buy back with the 60 million of new debt that it issues?
- b) What is the market value of the firm (equity plus debt) after the change in capital structure and what is the debt equity ratio after the change in structure?
- c) Give the names of the three forms of market efficiency and explain their meaning.



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**Question 3**

**15 marks**

A company has an EPS= 15 and the dividend pay-out ratio which is 40 percent. The risk adjusted discount rate is 10 percent and the return on retained earnings is 12 percent.

- a) Calculate the cash cow value of the stock (All earnings is paid as dividend).
- b) Calculate the Present value of the growth opportunity.
- c) Calculate the value of the stock adding up both the cash cow value and the value of the growth opportunity.

**Question 4**

**15 marks**

- a) Explain in text and in a figure Modigliani proposition 1 and 2 with taxes.
- b) When a company is in financial distress the shareholders are tempted to take on very large risks with a very low probability to for success. Describe in words such a situation.
- c) Calculate the value of a European call option. S is the stock price today Su is the stock price if it goes up and Sd is the stock-price if it goes down. EX is the strike price.  
 $S_0=40$   
 $S_u=42$   
 $S_d=38$   
 $r=8\%$   
 $EX=39$   
 $T=1 \text{ month}=0.0833 \text{ Years}$



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## Formulas

1 The rate of return of an asset during the period from t to t+1  $r = \frac{P_{t+1} - P_t}{P_t}$

2 Effective interest rate  $\left(1 + \frac{r}{m}\right)^m - 1$

Where m is the number of pay-outs of the interest rate during the period and r is the interest rate.

3 Euler constant  $e = 2.718281828$

### Present value and future value discretely compounded

4 Future value  $FV = C_0(1 + r)^T$

5 Present value  $PV = \frac{C_1}{(1+r)^T}$

6 Net present value for an investment that lasts for one period  
 $NPV = -C_0 + \frac{C_1}{1+r}$

### Present value and future value continuous compounded

Continuous paid interest rate

7 Future value  $FV = C_0 * e^{rT}$

8 Present value  $PV = C_T * e^{-rT}$

C is the amount

### Bond valuation

C = coupon

F = The face value.

T = Time to maturity

r = Risk adjusted discount rate.

9  $P = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^T} + \frac{F}{(1+r)^T}$

Zero coupon bond

10  $P = \frac{F}{(1+r)^T}$

Perpetuity

The present value of an amount paid in perpetuity.

11  $PV = \frac{C}{r}$

If we have a constant growth from next periods amount.



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$$12 \quad PV = \frac{C_1}{r-g}$$

**Present value of an annuity.**

$$13 \quad PV = C \left[ \frac{1}{r} - \frac{1}{r*(1+r)^T} \right]$$

Present value of an annuity that lasts forever but starts at T years from now.

$$14 \quad PV = \frac{C}{r} * \frac{1}{1+r^T}$$

When the annuity increases with g.

15

$$PV = C_1 \left[ \frac{1}{r-g} - \frac{1}{r-g} * \left( \frac{1+g}{1+r} \right)^T \right]$$

## Statistics

Average value.

$$16 \quad \text{Mean} = \bar{R} = \frac{(R_1 + R_2 + R_T)}{T}$$

Varians

sample

$$17 \quad \text{Var} = \frac{1}{N-1} [(R_1 - R)^2 + (R_2 - R)^2 + \dots + (R_T - R)^2]$$

Covarians

$$18 \quad \text{Cov}(R_A, R_B) = E(R_A - \bar{R}_A) * (R_B - \bar{R}_B)$$

Correlation



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$$19 \quad \rho_{AB} = \text{Corr}(R_A, R_B) = \frac{\text{Cov}(R_A, R_B)}{\sigma_A * \sigma_B}$$

### Stock valuation

Expected return of a stock

$$20 \quad \text{Expected\_Return} = r = \frac{\text{Div}_1 + P_1 - P_0}{P_0}$$

$$21 \quad \text{Expected\_Return} = r = \frac{(P_1 - P_0) * (1 - T_C) + \text{Div}_1 (1 - T_{Div})}{P_0}$$

Stock price

$$22 \quad p_0 = \frac{\text{Div}_1}{r} = \frac{\text{EPS}_1}{r} \quad \text{if Div=EPS}$$

Div = Dividend

P = Price

In case you have a dividend tax.

$$23 \quad \text{PV of dividend year 1} = \frac{(1 - T) \text{Div}_1}{(1 + r)^T}$$

For a constant growing firm

$$24 \quad P = \frac{\text{Div}_1}{r - g}$$

In case we calculate the investment as side effect and earnings equals dividend.

$$25 \quad p_0 = \frac{\text{EPS}_1}{r} + \text{PVGO}$$

In case there is a growth in the earnings per share.

$$26 \quad p_0 = \frac{\text{EPS}_1}{r - g} + \text{PVGO}$$

$$27 \quad \frac{\text{Price per share}}{\text{EPS}} = \frac{1}{r} + \frac{\text{PVGO}}{\text{EPS}}$$

$$28 \quad \frac{\text{Price}}{\text{Earnings}} \cdot \text{Earnings} = \text{Price}$$

$$29 \quad \text{Plowback ratio} = 1 - \text{payout ratio} = 1 - \frac{\text{DIV}}{\text{EPS}}$$

Where does  $r$  comes from

$$30 \quad r = \frac{\text{Div}}{P_0} + g$$



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Book value of return

$$31 \quad \text{Book value of return} = \frac{\text{Book income}}{\text{Book assets}}$$

*Earnings per share*

$$32 \quad \text{EPS} = \frac{\text{Earnings}}{\text{Total number of Shares}}$$

$$33 \quad \text{Shares} = \frac{\text{Total firm value}}{\text{Price per share}}$$

$$34 \quad \text{Debt ratio} = \frac{D}{D+E}$$

## Portfolio

**Valuation of a portfolio with two risky assets.**

The risk as variance

$$35 \quad \sigma_p^2 = x_a^2 \sigma_a^2 + x_b^2 \sigma_b^2 + 2x_a x_b \rho_{ab} \sigma_a \sigma_b$$

Expected return

$$36 \quad E[r_p] = x_a * E[r_a] + x_b * E[r_b]$$

$x$  = the portfolio weight

$\sigma$  = the standard deviation

$\rho$  = the correlation

**Risk and cost of capital**

**Security Market Line**



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$$37 \quad \text{Sharpe\_Ratio} = \frac{\text{Risk\_premium}}{\text{Std\_dev}} = \frac{r - r_f}{\sigma}$$

The slope of the Security Market line is:

$$38 \quad \text{Slope of SML} = \frac{E[r_1] - E[r_2]}{\beta_1 - \beta_2}$$

$$39 \quad \beta = \frac{\sigma_{S,M}}{\sigma_M^2}$$

Calculate the expected return on an asset on the Security Market Line

$$40 \quad E[r_p] = r_f + \text{Slope of SML} * \sigma_p$$

Expected risk premium.

$$41 \quad r - r_f = \beta(r_m - r_f)$$

Market return

$$42 \quad r_m = r_f + \text{Risk\_premium}$$

Risk premium on individual security

$$43 \quad E(r_i) - r_f = \frac{\text{Cov}(r_i, r_M)}{\sigma_M^2} [E(r_M) - r_f] = \beta [E(r_M) - r_f]$$

$$44 \quad R^2 = \frac{\beta^2 \sigma_M^2}{\sigma^2} = \frac{\text{Explained\_variance}}{\text{Total\_variance}}$$

## Duration

How long time does it take to get your money back?

Start by calculating the value of the bond

D=Duration

$$45 \quad P = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^T} + \frac{N}{(1+r)^T}$$

$$46 \quad D = \frac{t_1 * \frac{C}{1+r} + t_2 * \frac{C}{(1+r)^2} + \dots + t_T * \frac{C}{(1+r)^T} + t_T * \frac{N}{(1+r)^T}}{P}$$

P is the value of the bond and t is the time.



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To calculate the change of the price of a bond when the yield changes. You need the modified duration.

$$47 \quad D^* = \frac{D}{1+r}$$

Then you can calculate the change of the price of the bond. The price of the bond is called B

$$48 \quad \Delta B = -BD^* \Delta r$$

### Inflation

An approximation

$$49 \quad r_{real} \approx r_{nom} - i$$

An exact formula

$$50 \quad 1 + r_{nom} = (1 + r_{real}) * (1 + i)$$

### Cost of equity capital and firm value

CAPM

$$51 \quad E[r_E] = r_f + \beta * (E[r_m] - r_f)$$

$$52 \quad r_E = r_A + (D/E_L) * (r_A - r_D)$$

$$53 \quad r_E = r_A + \frac{D}{E} * (1 - T_C) * (r_A - r_D)$$

$$54 \quad r_{WACC} = r_D * \frac{D}{E+D} + r_E * \frac{E}{E+D}$$

$$55 \quad r_{WACC} = r_D * (1 - T_C) * \frac{D}{E+D} + r_E * \frac{E}{E+D}$$

$$56 \quad r_{WACC} = \frac{EBIT(1-T_C)}{E+D}$$

$$57 \quad V_L = V_u$$

$$58 \quad V_U = \frac{EBIT * (1 - T_C)}{r_A}$$

$$59 \quad V_L = V_u + T_C * D$$

$$60 \quad V_L = \frac{EBIT * (1 - T_C)}{r_A} + T_C * D$$

$$61 \quad PV_{Tax\ shield} = \frac{T_C * r_D * D}{r_D} = T_C * D$$



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## Derivatives

Value of a forward contract

$$62 \quad F = S_0 e^{(r^*T)}$$

Options

The Profit for the party who has bought the call option.

$$63 \quad Profit = \max(S_T - EX, 0) - c$$

The profit for the party who has sold the call option

$$64 \quad Profit = \min(EX - S_T, 0) + c$$

The profit for the party who have bought the put option

$$65 \quad Profit = \max(EX - S_T, 0) - p$$

The profit for the party who have sold the put option. The short position.

$$66 \quad Profit = \min(S_T - EX, 0) + p$$

Formulas for calculation of option price using binomial tree.

Delta of a call option

$$67 \quad \Delta = \frac{c_u - c_d}{S_u - S_d}$$

$$68 \quad S_0 u \Delta - c_u \text{ up move of the stock}$$

$$69 \quad S_0 d \Delta - c_d \text{ down move of the stock}$$

$$70 \quad S_0 \Delta - c = (S_0 u \Delta - c_u) * e^{-rT}$$