UNIVERSITY
OF SKÖVDE

School of Business

WRITTEN EXAMINATION

Course Corporate Finance Management

Sub-course

Course code FÖ338G | Credits for written examination 7,5

Date 2025-02-28 | Examination time 14.15-18.30

Examination responsible Hans Mörner

Teachers concerned Hans Mörner, Joachim Samuelsson

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!

Total number of pages 10

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Question 1 15 marks

a) Explain what a zero-coupon bond is?

b) What do we mean by an annuity?

c) What is a call option?

d) Name the three forms of market efficiency?

e) State the Modigliani Miller proposition two with and without corporate taxes and explain its meaning?

Question 2 15 marks

A firm is considering two different alternative production methods. One of them last for three years and the other last for four years. They have a cost for purchase the machines and a yearly maintenance cost. The opportunity cost is 10 percent.

Year	Method 1 Cost	Method 2 Cost
0	900	800
1	20	80
2	20	80
3	20	80
4		80

a) Calculate the net present value of the costs of the production methods?

b) Then calculate the yearly costs of the two methods.

c) What do we mean by opportunity cost?

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Question 3 15 marks

a) Assume you have two risky assets in your portfolio. You have 60 percent invested in asset A and 40 percent invested in asset B. The expected return in asset A is 15% and the expected return in asset B is 10%. The risk in asset A is measured to be σ=0.3 and in asset B the risk is measured to be σ=0.2 The correlation between them is -0.4. Calculate the risk and the expected return in the portfolio.

b)

c) You have two risky assets with a coefficient of correlation equal to ρ=-1. Draw a chart with a portfolio with different combination of the risky assets where you pay attention to the effect the coefficient of correlation has on the effect on the risk in the portfolio.

d) Here are inflation rates and U. S. stock market and Treasury bill returns between 1929 and 1933.

Year	Inflation	Stock Market Return	T-Bill Return
1931	-9.5	-43.9	1.1
1932	-10.3	-9.9	1.0
1933	0.5	57.3	0.3

Calculate the real return on the stock market each year and risk premium each year.

Question 4 15 marks

The expected market risk premium is 9.4% and the return on a treasury bill is 4.9% and the variance of the market portfolio is $\sigma^2 = 0{,}04326$
There is a stock with a covariance between the market portfolio and the stock is $\sigma_{M,S} = 0{,}0635$

a) Calculate β of the stock.
b) Determine the required rate of return on the stock.
c) Assume that you have bought a call option for 5 Eur with a strike price of 100 Eur. Show in a figure the profit and loss structure of the call option at the end of the life of the option. You have the different values of the underlying stock on the x-axis and the profit or loss values on the y-axis.

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Formulas

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

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.

Euler constant $e = 2.718281828$

Present value and future value discretely compounded

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

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

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

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

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

C is the amount

Bond valuation

C = coupon
N= The face value.
T = Time to maturity
r = Risk adjusted discount rate.

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

Zero coupon bond

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

Perpetuity

The present value of an amount played in perpetuity.

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

If we have a constant growth from next periods amount.

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

Present value of an annuity.

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

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

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

When the annuity increases with g.

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

Statistics

Average value.

$$Mean = \overline{R} = \frac{(R_1 + R_2 + R_T)}{T}$$

Varians

sample

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

Covarians

$$Cov(R_A, R_B) = E(R_A - \overline{R}_A) * (R_B - \overline{R}_B)$$

Correlation

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

Stock valuation

Expected return of a stock

$$Expected\_Return = r = \frac{Div_1 + P_1 - P_0}{P_0}$$

$$Expected\_Return = r = \frac{(P_1 - P_0) * (1 - T_C) + Div_1(1 - T_{Div})}{P_0}$$

Stock price

$p_0 = \frac{Div_1}{r} = \frac{EPS_1}{r}$ if Div=EPS

Div = Dividend
P = Price

In case you have a dividend tax.

$$PV\ of\ dividend\ year\ 1 = \frac{(1-T)Div_1}{(1+r)^T}$$

For a constant growing firm

$$P = \frac{Div_1}{r - g}$$

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

$$p_0 = \frac{EPS_1}{r} + PVGO$$

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

$$p_0 = \frac{EPS_1}{r - g} + PVGO$$

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

$$\frac{Price}{Earnings}' Earnings = Price$$

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

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Where does r comes from

$$r = \frac{Div}{P_0} + g$$

Book value of return

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

Earnings per share

$$\text{EPS} = \frac{\text{Earings}}{\text{Total number of Shares}}$$

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

$$Debt\ ratio = \frac{D}{D+E}$$

Portfolio

Valuation of a portfolio with two risky assets.

The risk as variance

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

Expected return

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

x = the portfolio weight
σ = the standard deviation
ρ = the correlation

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Risk and cost of capital

Security Market Line

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

The slope of the Security Market line is:

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

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

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

$$E[r_p] = r_f + Slope\ of\ SML * \sigma_p$$

Expected risk premium.

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

Market return

$$r_m = r_f + Risk\_premium$$

Risk premium on individual security

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

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

Duration

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

Start by calculating the value of the bond

D=Duration

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

$$D = \frac{t^*_1 \frac{C}{1+r} + t_2 * \frac{C}{(1+r)^2} + \ldots + t_T \frac{C}{(1+r)^T} + t_T \frac{N}{(1+r)^T}}{\mathrm{P}}$$

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

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

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

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

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

Inflation

An approximation

$$r \approx R - i$$

An exact formula

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

Cost of equity capital and firm value

CAPM

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

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

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

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

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

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

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$$V_L = V_u$$

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

$$V_L = V_u + T_C * D$$

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

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

Derivatives

Value of a forward contract

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

Options

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

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

The profit for the party who has sold the call option

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

The profit for the party who have bought the put option

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

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

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