UNIVERSITY
OF SKÖVDE

School of Business

WRITTEN EXAMINATION

Course Corporate Finance Management

Sub-course

Course code NA308G

Credits for written examination 5 hp

Date 2023-11-16

Examination time 08.15-13.30

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 compounding interest is.
b) Describe what internal rate of return is.
c) Give an example of a company in financial distress where the management has incentives towards underinvestment.
d) Name and explain the three forms of market efficiency.
e) State the Modigliani Miller proposition one without taxes and with taxes and explain its meaning.

Question 2 **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) Draw in a figure the security market line and mark the market portfolio, the risk-free interest rate and β of the stock.

Question 3 **15 marks**

a) When you enter into forward contract there are no money involved but if you want a call option you have to pay for a premium. Why is there such a difference?

b) You want to buy a call option. The strike price is 75 kronor and you pay 3 kronor for the call. Calculate the profit or loss at different values of the underlying stock at the end of the life of the call option. Then you draw a figure to show the result.

c) What is an at the money option?

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Question 4 **15 marks**

Executive Chalk is financed solely by common stock and has outstanding 25 million shares with a market price of $10 a share. It now announces that it intends to issue $160 million of debt and to use the proceeds to buy back common stock.

a) How is the market price of the stock affected by the announcement?
b) How many shares can the company buy back with $160 million of new debt that is issued?
c) What is the debt ratio after the change in capital structure?

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

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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.

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

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.

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

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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

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

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

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

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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.

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

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

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

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

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

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

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

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

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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

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

$$r_m = r_f + Risk\_premium$$

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Risk premium on individual security

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

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

Duration

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

Start by calculating the value of the bond

D=Duration

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

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

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

$$r = \frac{R-i}{1+i}$$

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Cost of equity capital and firm value

CAPM

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

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

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

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

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

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

$$V_L = V_u$$

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

$$V_L = V_u + T_C * D$$

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

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

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.

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