UNIVERSITY OF SKÖVDE

School of Business

WRITTEN EXAMINATION

Course Corporate Finance Management

Sub-course

Course code NA308G | Credits for written examination 5 hp

Date 2024-03-21 | Examination time 14.15-19.30

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 11

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Question 1 **15 marks**

a) Explain what semi-annual interest rate and continuous compounding interest rate are?
b) Increased debt in a firm has advantages. To much debt can encourage the shareholders not to work in the entire firm's interest. Give an example.
c) What is incremental internal rate of return?
d) Name and explain the three forms of market efficiency.
e) Describe what β is and how it is calculated?

Question 2 **15 marks**

Percival Hygiene has 10 million dollars invested in long-term corporate bonds. This bond portfolio's expected annual rate of return 9 %, and the annual standard deviation is 10%. Amanda Reckonwith, Percival's financial adviser, recommends that Percival consider investing in an index fund that closely tracks the Standard & poor's 500 index. The index has an expected return of 14%, and a standard deviation of 16%.

a) Suppose Percival puts all his money in a combination of the index fund and Treasury Bills. Can he thereby improve his expected return without changing the risk of his portfolio? The Treasury Bill yield is 6%

b) Could Percival do even better by investing equal amounts in the corporate bond portfolio and the index fund? The correlation between the portfolio and the index fund is + 0.1.

c) In portfolio theory we talk about the front. Describe what a front is.

Question 3 **15 marks**

a) We have six factors determining the value of the option. Name three of them and describe their effect on the option price.

b) You are asked to value an at-the-money call option using a one-step binomial tree. The stock price is 50, the risk-free interest rate is 10 percent, there are three months to maturity. If the stock price goes up it will reach 60 and if it goes down it will fall to 40 by the end of the life of the option. What is the value of the call option?

c) A company pays a dividend per share of 100 SEK tomorrow. The company has a growth rate of 5 percent and the risk adjusted discount rate is 10 percent. What is the value of the stock?

Question 4 **15 marks**

A firm's earnings are 750,000 SEK per year in perpetuity. The return on asset is 15 percent. The firm is equity financed. The management has planned to introduce debt by retire 50 percent of the equity and introduce debt. The return on debt is 7 percent.

a) Calculate the value of the firm and the return on equity after debt has been introduced.
b) Calculate the return on equity after debt has been introduced assume there is a company tax of 35 percent.
c) Explain Modigliani Miller proposition 1 and 2 with and without taxes.

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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-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

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

$$R^2 = \frac{\beta^2 \sigma_M^2}{\sigma^2} = \frac{Explained\_var\ i\ ance}{Total\_var\ i\ ance}$$

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

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

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

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

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.

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