UNIVERSITY
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School of Business

WRITTEN EXAMINATION

Course Corporate Finance Management

Sub-course

Course code NA308G | Credits for written examination 5 hp

Date 2025-03-28 | 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

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Question 1 — 15 marks

a) What is internal rate of return?

b) Increased debt in a firm has advantages. Too much debt can encourage the shareholders not to work in the entire firm's interest. Give an example.

c) What is net-working capital?

d) If a company wants to distribute money to the shareholders it can either pay dividend or repurchase shares. The choice has implications on the share price. Explain.

e) Prospect theory is discussed in the section about Behavioral Finance. Explain what they mean about it.

Question 2 — 15 marks

Johnson Paint stock has an expected return of 19 % and a beta of 1.7, while Williamson Tire stock has an expected return of 14 % and a beta of 1.2. Assume that the CAPM holds.

a) What is the expected return on the market?

b) What is the risk-free rate?

c) Explain the link between the Capital Asset Pricing Model and the Security Market Line.

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Question 3 **15 marks**

We have a company with the following characteristics.

Earnings 10 million
Number of shares 500,000
Discount rate 8 percent
Return on equity 12 percent.

a) When you discount cash flow to value a stock the level of the discount rate is primarily determined by a specific factor. What is that factor?

b) Calculate the cash cow value of the stock.

c) Assume a payout ratio of 50 percent. Calculate the value of the PVGO and the value of the firm.

Question 4

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) Explain Modigliani Miller proposition 1 and 2 with and without taxes.

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Formulas

Rate of return and effective interest rate

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.

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

Euler constant $$e = 2.718281828$$

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.

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

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

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

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

Where does r comes from

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

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

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

An exact formula

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

Cost of equity capital and firm value

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

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

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

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

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

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

$$V_L = V_u$$

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

$$V_L = V_u + T_C * D$$

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

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

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.

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

Upper bound for a call option

$$c \leq S_0$$

Lower bound for a call option

$$c \geq S_0 - EX * e^{-r*T}$$

Delta of a call

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$$\Delta = \frac{c_{11} - c_{10}}{S_0 u - S_0 d}$$

Or

$$\Delta = \frac{\partial c}{\partial S}$$

Delta for a put

$$\Delta = \frac{p_{11} - p_{10}}{S_0 u - S_0 d}$$

Or

$$\Delta = \frac{\partial p}{\partial S}$$