



UNIVERSITY  
OF SKÖVDE

School of Business

## WRITTEN EXAMINATION

Course Corporate Finance Management

Sub-course

Course code NA308G

Credits for written examination 5 hp

Date 2025-05-23

Examination time 14.15-19.15

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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!*



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**Question 1**

**15 marks**

- a) What is the difference between a forward contract and an option?
- b) Increased debt in a firm has advantages and it increases firm value. Too much debt can encourage the shareholders not to work in the entire firm's interest and that can reduce firm value. Give an example.
- c) Draw the Capital Market Line in a figure and describe what it is?
- d) What is meant by yield to maturity?
- e) Describe what equivalent annual cost (or equivalent annual cash flow) is?

**Question 2**

**15 marks**

- a) Name the three forms of market efficiency?
- b) Strom inc is an all-equity firm with 250,000 shares of common stocks outstanding. Each share is worth \$20. The firm pays no taxes. The appropriate discount rate for the firm's unleveraged equity is 15 percent. Strom's earnings last year were \$750,000 and management expects that the firm's earnings will remain at \$750,000 per annum in perpetuity.  
Strom is planning to buy a competitor's business for \$300,000. Once acquired, the competitor's facilities are expected to increase Strom's earnings by 120,000 per year. The competitor is also an all-equity firm with the same risk as Strom and a required return of its equity of 15 percent.

Construct a market value balance sheet after the announcement of the buyout is made.

- c) What will Strom's new share price be?



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**Question 3**

**15 marks**

- a) How does a repurchase of stocks programme affect the P/E ratio of a stock?
- b) Explain Modigliani Miller proposition 2 with and without taxes.
- c) A firm has perpetual EBIT of 4 million per year. The return on asset is 15% tax rate is 35% cost of debt is 10% and the firm has 10 million of debt in the capital structure

**Question 4**

**15 marks**

You have two risky assets to invest in. Below you can see data about them and how they are correlated.

	$E[r_{Asset}]$	$\sigma$	$\rho_{A,B}$
Asset A	15%	30%	-0.4
Asset B	8%	18%	

Assume that you want to invest 60% in asset A and the rest in asset B.

- a) Draw the covariance, variance matrix based on the figures above.
- b) Calculate the expected rate of return and the risk in the portfolio.
- c) Draw, in a figure, an example of an efficient front and describe what it is.



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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.

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

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.

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

Varians

sample

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

Covarians

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

Correlation



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

### Stock valuation

Expected return of a stock

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

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

Stock price

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

Div = Dividend

P = Price

In case you have a dividend tax.

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

For a constant growing firm

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

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

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

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

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

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

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

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



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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

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

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

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

## 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

$\sigma$  = the standard deviation

$\rho$  = the correlation

## Risk and cost of capital



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### Security Market Line

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

The slope of the Security Market line is:

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

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

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

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

Expected risk premium.

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

Market return

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

Risk premium on individual security

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

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

### Duration

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

Start by calculating the value of the bond

D=Duration

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





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

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

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.

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