



EXAM

Course code:	BE-410
Course name:	Corporate Finance
Date:	April 15, 2013
Duration:	4 hours
Number of pages incl. front page:	12
Resources allowed:	Calculator, dictionary
Notes:	The exam must be answered in English. Answers in Norwegian will not be graded.

Collection of formulas

$$PV = \sum_{n=0}^N \frac{C_n}{(1+r)^n}$$

$$\text{Perpetuity, } PV = \frac{C}{r}$$

$$\text{Growing perpetuity, } PV = \frac{C}{r-g}$$

$$\text{Annuity, } PV = \frac{C}{r} \left[1 - \frac{1}{(1+r)^N} \right]$$

$$\text{Growing annuity, } PV = \frac{C}{r-g} \left[1 - \frac{(1+g)^N}{(1+r)^N} \right]$$

$$\text{Effective annual rate, } EAR = \left(1 + \frac{APR}{k} \right)^k - 1$$

$$Var = \frac{1}{T-1} \sum_{t=1}^T (R_t - \bar{R})^2$$

$$Cov = \frac{1}{T-1} \sum_{t=1}^T (R_{it} - \bar{R}_i)(R_{jt} - \bar{R}_j)$$

$$E(R_p) = \sum_i x_i E(R_i)$$

$$Var(R_p) = \sum_{i=1}^N \sum_{j=1}^N x_i \times x_j \times Cov(R_i, R_j)$$

$$r_I = r_f + \beta_I \times [E(R_{Mkt}) - r_f]$$

$$\beta_I = \frac{Cov(R_I, R_{Mkt})}{Var(R_{Mkt})}$$

$$\beta_U = \frac{E}{E+D} \beta_E + \frac{D}{D+E} \beta_D (1 - \tau_c)$$

$$E(R_s) = r_f + \beta_s^{Mkt} [E(R_{Mkt}) - r_f] + \beta_s^{SMB} E(R_{SMB}) + \beta_s^{HML} E(R_{HML}) + \beta_s^{PR1YR} E(R_{PR1YR})$$

$$r_E = r_U + \frac{D}{E} (r_U - r_D)$$

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{D+E} r_D (1 - \tau_c)$$

$$\tau^* = 1 - \frac{(1 - \tau_c)(1 - \tau_e)}{(1 - \tau_i)}$$

$$\tau_d^* = \frac{\tau_d - \tau_g}{1 - \tau_g}$$

$$r_d = y - pL$$

$$C = P + S - PV(K) - PV(Div)$$

$$\Delta = \frac{C_u - C_d}{S_u - S_d}$$

$$B = \frac{C_d - S_d \Delta}{1 + r_f}$$

$$C = S \Delta - B$$

$$C = S \times N(d_1) - PV(K) \times N(d_2)$$

$$P = PV(K) [1 - N(d_2)] - S [1 - N(d_1)]$$

$$d_1 = \frac{\ln S / PV(K) + \sigma \sqrt{t}}{\sigma \sqrt{t}} \frac{1}{2}$$

$$d_2 = d_1 - \sigma \sqrt{t}$$

$$S^* = S - PV(Div)$$

$$S^* = S / (1 + q)$$

$$\rho = \frac{(1 + r_f) S - S_d}{S_u - S_d}$$



$$\beta_E = \Delta \left(1 + \frac{D}{E}\right) \beta_U, \beta_D = (1 - \Delta) \left(1 + \frac{D}{E}\right) \beta_U$$

$$\sigma_A = \frac{E}{D-E} \sigma_E = \frac{\sigma_E}{1 + \frac{D}{E}}$$

$$DD = \frac{\ln\left(\frac{V}{F}\right) + \left(\mu - \frac{\sigma^2}{2}\right)t}{\sigma\sqrt{t}}$$

$$Z = 1.2 \frac{WC}{TA} + 1.4 \frac{RE}{TA} + 3.3 \frac{EBIT}{TA} + 0.6 \frac{MVE}{TL} + 1.0 \frac{S}{TA}$$

$$p = N\left(\frac{\log(D_T + C_T) - \log(A - F) - \mu T + \frac{1}{2}\sigma^2 T}{\sigma\sqrt{T}}\right)$$

$$F_T = S \frac{(1 + r_{\$})^T}{(1 + r_{\epsilon})^T}$$

$$Duration = \sum_t \frac{PV(C_t)}{P} \times t$$

$$\text{Percentage change in Value} = -Duration \times \frac{\epsilon}{1 + r/k}$$

$$r_E^* = \frac{1 + r_E}{1 + r_{\$}} (1 + r_{\$}^*) - 1$$



Question 1 (10 points)

a) Which of the following implications of market efficiency is true?

- (i) Investors are able to earn consistent abnormal returns by applying trading strategies based on historical market patterns
- (ii) Investors who subscribe to the newsletter published by a well-known brokerage house have been consistently able to earn higher returns than those who do not subscribe
- (iii) A naïve buy-and-hold strategy yields approximately the same return as an active trading strategy
- (iv) Investors who follow insiders' trading patterns always make additional returns

b) A firm has a market value of equity of 20 million, while the book value is 15 million. The current market value of its debt is 5 million, while the book value is 4.9 million. The beta value of the firm's equity is 0.85 at present and the corporate tax rate is 0%. The firm is planning a leveraged recapitalization, wherein it will take up new debt worth 10 million and use the proceeds to repurchase equity. The transaction is expected not to influence the value of the firm's current debt. How will the leveraged recapitalization influence the firm's beta value?

- (i) New $\beta = 0.68$
- (ii) New $\beta = 0.85$
- (iii) New $\beta = 1.00$
- (iv) New $\beta = 1.70$
- (v) New $\beta = 2.55$

c) Firm Y has a capital structure that consists of 60 percent long-term debt and 40 percent common stock. The company's CFO has obtained the following information:

- The before-tax yield to maturity on the company's bonds is 8%.
- The company's stock is expected to pay \$3.00 dividend next year, and the dividend is expected to grow at a constant rate of 7% a year. The common stock currently sells for \$60/share.
- The firm will be able to use retained earnings to fund the equity portion of its capital budget.
- The company's tax rate is 40%.

What is the company's weighted average cost of capital (WACC)?

- (i) 12.00%
- (ii) 8.03%
- (iii) 9.34%
- (iv) 8.00%
- (v) 7.68%

d) A one-year Treasury security currently returns a 4.50% yield to maturity. A two-year Treasury security offers a 4.80% yield to maturity. If the expectations hypothesis is true, what is the expected return on a one-year security next year?

- (i) 4.80%
- (ii) 4.90%
- (iii) 5.00%
- (iv) 5.10%



- e) On October 4th, 2000, long distance company, EarthCOM, issued bonds to finance a new wireless product. The bonds were issued for 30 years (mature on October 4th, 2030), with a face value of \$1,000, and semi-annual coupons. The coupon rate on these bonds is 8% APR. Over the last 4 years, the company has experienced financial difficulty as the long distance market has grown more competitive. The risk associated with EarthCOM bonds has increased dramatically, as investors now want a 15% APR yield to maturity to hold the bonds. What price should the bonds trade at as of October 5th, 2004?
- (i) \$544.19
 - (ii) \$545.66
 - (iii) \$794.99
 - (iv) \$800.15
 - (v) \$520.92



Question 2 (10 points)

- a) In a research study Agrawal and Nagarajan (1990) compared two groups of firms: firms with all-equity capital structures and similarly-sized, but levered firms. They found that the all-equity firms differed significantly from the levered firms in three respects: they had fewer shareholders, larger managerial stockholdings, and greater family involvement. Briefly explain how you would motivate this finding. (2 points)
- b) In early 1997, the biotech firm Cephalon, Inc was contemplating its financing needs. Its first major drug would soon either be approved or disapproved by the US Food and Drug Administration, and management expected a need to raise large sums of cash if the drug were approved. Motivate if you consider the following statement to be true or false: purchasing call options on its own stock would be an attractive financing strategy to Cephalon Inc. (2 points)



c) Which type of firm in each of the following pairs is more likely to experience a loss of customers in the event of financial distress, and why? (2 points)

(i) Campbell Soup Company or Intuit, Inc. (a maker of accounting software)?

(ii) Allstate Corporation (an insurance company) or Reebok International (a footwear and clothing firm)?

d) Which type of asset in each of the following pairs is more likely to be liquidated for close to its full market value in the event of financial distress, and why? (2 points)

(i) An office building or a brand name?

(ii) Patent rights or engineering “know-how”?



e) You have the following information about a firm's share:

- The value of the share decreases by 0.38% for each 1% increase in the British 10-year interest rate.
- The value of the share increases by 1.22% for each 1% increase in the FTSE 100.
- The value of the share decreases by 0.12% for each 1% increase in the GBP/USD rate.

Your studies show that the 10-year British interest rate, FTSE 100, and GBP/USD are priced risks with the following risk premia:

- British 10-year interest rate: -2.0%
- FTSE 100: 4.3%
- GBP/USD: 0.4%

The risk-free interest rate is 4.15%. Calculate the firm's cost of equity. (2 points)



Question 3 (16 points)

From a theoretical point of view market imperfections of different kinds are required to motivate corporate financial policies, such as debt financing, dividends, or risk management. Some of the imperfections covered in the course are financial distress costs, information asymmetries (adverse selection), and agency problems.

a) What do each of these three market imperfections imply for corporate risk management? When would they suggest that companies should manage risk? (4 points)

b) What do each of these three market imperfections imply for corporate dividend payments? When would they suggest that companies should pay dividends? (4 points)



- c) Discuss advantages and disadvantages of being a large rather than a small firm, in terms of expected financial distress costs, information asymmetries, and agency problems. (4 points)
- d) Markets for equity are efficient in many countries and there are great opportunities for investors to obtain internationally well-diversified portfolios. This has implications for the choice of cost of equity. Consider a Norwegian firm evaluating a planned project in Italy. Managers need you to assess the risk premium to apply to the project, which implies a branching out in terms of product mix and location of production. Briefly explain which one of the following four alternatives you would recommend. (4 points)
- (1) The current risk premium on the firm's equity defined as the Norwegian beta times the Norwegian market risk premium.
 - (2) The current risk premium defined as the firm's beta relative to a world market portfolio times the world market risk premium.
 - (3) The risk premium of an Italian firm producing a product very similar to the new product, defined as the Italian firm's beta relative to a world market portfolio times the world market risk premium.
 - (4) The risk premium of the same Italian firm defined as its beta relative to the Italian market portfolio times the Italian market risk premium.

Question 4 (14 points)

Suppose the current value of a firm is 100 and the annual standard deviation of returns on the firm's assets is 20% and its asset beta is 0.8. The firm has pure-discount debt consisting of a promise to pay debt holders the amount 90 in one year. The risk-free rate is 5% and the market risk premium is 5%.

- a) Value the equity of the firm, assuming that it is a limited-liability firm, using replicating portfolios or risk-neutral probabilities. (4 points)

- b) Calculate the value of the equity holders' implicit put option to default on the debt. (3 points)



- c) Calculate the required yield to maturity on the firm's pure-discount bond. (2 points)
- d) Assuming an expected recovery rate of 45% and a probability of default of 0.7% over one year, what is the expected return on the firm's debt (it's cost of debt)? (2 points)
- e) Calculate the firm's distance to default, assuming that it is not paying any dividends. (3 points)