Written Exam for the B.Sc. or M.Sc. in Economics autumn 2012-2013

Corporate Finance and Incentives

Final Exam/ Elective Course/ Master's Course

19th February 2013

(3-hour closed book exam)

Please note that the language used in your exam paper must correspond to the language of the title for which you registered during exam registration. I.e. if you registered for the English title of the course, you must write your exam paper in English. Likewise, if you registered for the Danish title of the course or if you registered for the English title, which was followed by "eksamen på dansk" in brackets, you must write your exam paper in Danish.

If you are in doubt about which title you registered for, please see the print of your exam registration from the students' self-service system.

The exam consists of 4 problems. All problems must be solved. The approximate weight in the final grade of each problem is stated. A problem can consist of different sub questions that do not necessarily have equal weight. Please provide intermediate calculations. Good luck ☺

Problem 1 (Various themes, 20%)

1. State the Put-Call Parity for a dividend paying stock and explain whether a holder of such a European call option would ever want to exercise prematurely.
2. In one period from now with 50/50 probability you will receive either 100 or loose 100. If you receive 100 in the first round there is 70/30 probability of receiving/loosing 100 in second round. If you loose 100 in round one there is 30/70 probability of receiving/loosing 100 in round two.
   a. What is the expected value of this investment (no discounting)?
   b. Identify the potential real option in this investment and calculate the value of this!
3. Explain (and preferable draw) what a "Butterfly Spread" is and what the purpose of holding such one is (how do you expect the underlying stock to behave?).
4. Explain what the beta value of a put option is and compare it to the beta value of the riskless bond and the underlying stock.

Problem 2 (Mean-Variance optimization and CAPM, 10%)

Consider the following covariance matrix and mean returns for the four securities A, B, C, and D:

$$\Omega = \begin{pmatrix} 0.021 & 0.019 & 0.017 & 0.000 \\ 0.019 & 0.030 & 0.008 & 0.000 \\ 0.017 & 0.008 & 0.039 & 0.000 \\ 0.000 & 0.000 & 0.000 & 0.000 \end{pmatrix} \qquad E(R_i) = \begin{pmatrix} 8\% \\ 12\% \\ 16\% \\ 2\% \end{pmatrix}$$

Assuming that these four securities make it up for the whole securities market answer the following:
1. Find the equations of the Capital Market Line and the Securities Market Line.
2. Find the beta values for the four securities A, B, C and D.

Problem 3 (Fixed Income, 30%)

Explain what Fixed Income theory is. In your explanation you could include (but should not feel limited to):
1. Bonds and valuation
2. Complete markets
3. Zero coupon bonds
4. Synthetically creating bonds
5. Bootstrapping
6. Yield to maturity
7. Term structure
8. Spot rates, forward rates, discount factors
9. Types of bonds
10. Duration
11. Convexity

Problem 3 (Capital structure, 40%) – it may be an advantage to consult appendix 1.

Consider a firm with the following stock prices and dividend payments over the last five years:

Time	Stock price	Dividend payments
-5	100	
-4	109	5
-3	113	5
-2	175	5
-1	183	5
0	125	5

Assume that CAPM holds and that the shown figures are representative for the expected future returns of the firm. The expected arithmetic average future market return is 10% and the risk free rate is 5%.

1. What is the Equity return and the Equity Beta of this firm?

The firm has the following perpetual profit and loss statements where only the interest payments deviate. You will be asked to answer questions based on either one or the other scenario and it will be clearly indicated which scenario you must refer to.

	Scenario 1	Scenario 2
Turnover	2,000	2,000
Operating costs	1,160	1,160
EBITDA	840	840
Depreciation & Amortization	290	290
EBIT	550	550
Interest payments	100	150
Earnings before taxes (EBT)	450	400
Tax (40%)	180	160
Profit after tax	270	240

In the following questions you must refer to scenario 1:

2. What is the value of Debt assuming debt is risk free?
3. What is the value of Equity?
4. What is the Asset Beta and what is the value of the un-levered firm? You should find the value of the un-levered firm using two different approaches leading to the same result.

In the following questions you must refer to scenario 2:

The debt is the same as in scenario 1 but the debt rate has now increased due to a (increased) perceived risk of lending out to the firm. The asset and equity returns are unaffected by this change in the debt rate.

5. What is the new value of the un-levered firm, Equity, Debt and the tax shield?
6. Value of un-levered firm + Value of tax shield = Equity + Debt
   Above is an identity in a risk free world. But in this case there is something missing. Explain what is missing and why. Quantify this effect and describe by an equation.

Appendix 1: Un-levering and de-levering

The (Asset) return of the unlevered firm (de-levering / un-levering):

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

The (Asset) beta of the unlevered firm (de-levering / un-levering):

$$\beta_A = \left(\frac{E}{E + D(1-T_C)} \right) \beta_E + \left(\frac{D(1-T_C)}{E + D(1-T_C)} \right) \beta_D$$

Re-levering:

$$\beta_E = \left(\frac{E + D(1-T_C)}{E} \right) \beta_A - \left(\frac{D(1-T_C)}{E} \right) \beta_D = \beta_A + \left(\frac{D(1-T_C)}{E} \right) (\beta_A - \beta_D)$$

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

Where subscript "A" refer to (unlevered) Assets, "E" Equity, "D" Debt, and "T_C" is the corporate tax rate