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

20th December 2012

(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. What are the Macaulay Duration and the Modified Duration of a 5% annuity loan over 10 years and what do these numbers tell us?
2. Explain what Convexity is, how we calculate it and what we use it for.
3. Explain what a real option is, give a numerical example of a real option and calculate the value of the real option in your example.
4. Explain the put-call parity and explain what effect it has on a European put option on a non-dividend paying stock if the time to maturity of the option increases.

Problem 2 (Factor Models and Arbitrage Pricing Theory, 20%)

What are Factor Models and APT? In your explanation you could include (but should not feel limited to):
1. Assumptions
2. Describe what a factor model is
3. Types of independent variables in factor models
4. Comparison to CAPM
5. Give an example
6. Show what a pure factor model is
7. Show what an arbitrage is
8. Etc.

Problem 3 (Options, 20%)

Consider a European call option on a non-dividend paying stock, which is currently trading at a price of $100. Each period, the stock price can either go up by $20 or down by $20. Time to maturity is two periods and the risk free rate is 5% per period.

1. Draw a binomial tree of above stock value distribution.
2. Find the risk-free probabilities for all periods and states.
3. What is the value of a call option with a strike price of $120?
4. What is the value of the corresponding put option?

Problem 4 (Capital structure and the cost of capital, 40%)

Consider a firm with the expected future perpetual profit and loss statement (cash flows):

Turnover	800
Operating costs	400
EBITDA	400
Depreciation & Amortization	100
EBIT	300
Interest payments	50
Earnings before taxes (EBT)	250
Tax (20%)	50
Profit after tax	200

The firm pays 5% on debt, which can also be assumed to be the risk free rate. The market risk premium is 10% and you can assume that CAPM holds. The firm's equity beta is 1.5

1. What is the expected return on equity and what is the market value of equity?
2. What is the market value of debt?
3. What is the total value of the firm and what is the value of the un-levered firm?
4. What is the value of the firm with maximum leverage?
5. Explain the downside of leverage and why firms do not just increase debt close to 100%.

The firm is made up of two division serving two different segments. One division (A) is serving the government on long-term contracts and the other division (B) is serving other firms on a highly competitive market. Division A is considered safe but not risk free and division B is considered more risky. The two divisions approximately turnover the same amount per year.

6. Comment on the above statement and in particular comment on what this means for the cost of capital in each of the two divisions.
7. Draw a graph showing what would happen if the firm applies the same hurdle rate to all its projects disregarding division and explain the graph.

There are not a lot of comparable firms in the industry for government services, but on the private side, there are a few other firms, which the firm considers close and similar competitors. The following information on the comparable firms is available:

	Expected return	Equity beta	D/(E+D)
Firm X	25%	2	48%
Firm Y	18%	1.3	21%
Firm Z	22%	1.7	40%

8. What is the cost of capital for each of the two divisions?