CATOLICA LISBON
SCHOOL OF BUSINESS & ECONOMICS

Undergraduate Programs in Economics and Business Administration

Finance I – First Midterm Exam

31-03-2012

INSTRUCTIONS:

- You are allowed 120 minutes for this exam (no tolerance given).
- Please write neatly. Illegible answers will be assumed to be incorrect.
- In order to receive full credit, you must show all your work.
- Please round off the final results to three decimal places.
- Good luck!

FORMULAE:

Present value of a growing annuity

$$PV = \frac{C}{r-g} \times \left(1 - \left(\frac{1+g}{1+r}\right)^{N}\right)$$

Real and nominal interest rates

$$1 + r_r = \frac{1+r}{1+i}$$

APR and EAR

$$1 + EAR = \left(1 + \frac{APR}{k}\right)^{k}$$

Constant dividend growth model

$$P_0 = \frac{Div_1}{r_E - g}$$

Dividends

$$Div_t = EPS_t \times Payout\ Rate_t$$

SECTION I (40 MINUTES)

You are the CFO of a shoe factory. The Director of Operations just asked your help to pick between two suppliers of raw materials the one that offers a better deal for an estimated order of €30,000.

- Supplier A:
  - 15% initial payment
  - Number of monthly payments: 60
  - Effective annual rate (EAR): 9.5%

- Supplier B:
  - 20% payment at maturity
  - Number of quarterly payments: 12
  - Annual percentage rate (APR): 8%

a) What is the monthly payment you will make to Supplier A if you pick this option?

b) What is the quarterly payment you will make to Supplier B if you pick this option?

c) Which supplier should you choose if your objective is to minimize the present value of all payments due in the first two years of the contract?

d) Suppose Supplier B proposes to supply your production indefinitely (as long as you operate) in exchange for a payment today of €400,000. What is the maximum opportunity cost of capital that makes this offer worthwhile?

SECTION II (40 MINUTES)

As of 31/12/2011, the prices of risk-free zero-coupon bonds with face values of €100 are as follows:

Maturity (years)	1	2	3	4
Price (€)	96.154	90.703	83.962	77.732

a) Compute the Yield to Maturity for the two-year and four-year zero-coupon bonds.

As of 31/12/2011, you can trade a four-year risk-free security with an annual coupon rate of 5% and a face value of €100 for a price of €97.

b) Assuming that the zero-coupon bonds in the table above are fairly priced, what would be your recommendation: buy or sell the security? Justify your answer.

c) Depending on your previous recommendation in question b), please illustrate how you would take advantage of a possible arbitrage opportunity. Quantify these potential arbitrage gains as of 31/12/2011.

Suppose that on 31/12/2011 you bought for €97 the abovementioned security that pays a 5% coupon. Today is 31/12/2012 (one year later), and you face the same yield curve you faced one year before.

d) What is the annual rate of return you obtained during the past year from buying the security? How much of this return came from coupon payments and how much came from capital gains? Explain your results in light of your previous answers (*Suggestion*: Use the yield to maturity and yield curve concepts).

SECTION III (40 MINUTES)

The Board of *RealSales*, a company specializing in internet sales, is discussing for the first time its dividend policy. Assume the first dividend will be paid in one year. *RealSales* currently trades at a price per share of €7.77, which corresponds to a price-to-earnings ratio of 18 (i.e., the current stock price divided by current earnings per share equals 18). The firm's equity cost of capital is 14%, and the company is growing at a constant rate of 11% per year. The Board of Directors believe that a dividend payout of 30% will reduce the perceived risk of the firm, and will bring the equity cost of capital down to 12.5%, while the growth rate will remain at 11%.

a) Given the current stock price, what is the dividend investors expect to receive next year?

b) You are asked to analyze whether two statements made by the Board Members about the expected impact of the proposed dividend policy on the firm are correct. Justify your answers using the constant dividend growth model. (*Suggestion*: write the constant dividend growth model in terms of current price-to-earnings ratio, instead of the current price alone.)
   i. *"The price-to-earnings ratio based on next year's earnings will be 3.8 percentage points higher."*
   ii. *"Based on the new estimates for the price-to-earnings ratio and for next year's earnings, the price of one share next year should be €9.6"*

c) Using the constant dividend growth model, show that if a firm commits to a payout rate of 100%, the firm's price-to-earnings ratio will converge to the inverse of the firm's equity cost of capital. Interpret briefly the expression obtained.