Carleton UNIVERSITY

SPROTT SCHOOL OF BUSINESS

Midterm
EXAMINATION
August 4, 2009

DURATION: **1.5** HOURS

No. of Students: **27**

Course: **BUSI 2504 B**

Instructor: **Mitch Murphy**

Student Name: _____

Student Number: _____

Grade: _____/24 + _____/22 = _____/46

AUTHORIZED MEMORANDA

BAII Plus calculator.

FORMULAS

$$FV = PV(1+r)^t; \qquad PV = \frac{FV}{(1+r)^t}; \qquad EAR = \left(1 + \frac{APR}{m}\right)^m - 1;$$

$$PV = PMT\left(\frac{1 - \frac{1}{(1+r)^t}}{r}\right) + \frac{FV}{(1+r)^t}; \qquad P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \ldots;$$

$$P_0 = \frac{D}{r}; \qquad P_0 = \frac{D_0(1+g)}{r-g} = \frac{D_1}{r-g}; \qquad R = \frac{D_1}{P_0} + g;$$

$$P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \cdots + \frac{D_t}{(1+r)^t} + \frac{P_t}{(1+r)^t}; \qquad P_t = \frac{D_{t+1}}{r-g};$$

PART A: MULTIPLE CHOICE (8 QUESTIONS - 24 MARKS)

[**3**] Q1. Which one of the following best illustrates the agency problem?

(a) an employee offers a suggestion which will save the company money and reduce the stress of his job.

(b) the company creates a management bonus program whereby managers are rewarded when the market price of the firm's stock rises.

(c) management rejects a merger which was desired by the shareholders.

(d) management expands its operations overseas which is favorably received by the financial markets.

[**3**] Q2. It is easiest to raise capital for a project under which form of business organization?

(a) Sole proprietorship.

(b) Corporation.

(c) General partnership.

(d) Limited partnership.

[**3**] Q3. In order to compare different investment opportunities (each with the same risk) with interest rates reported in different manners you should:

(a) Convert each interest rate to an annual nominal rate.

(b) Convert each interest rate to a monthly nominal rate.

(c) Convert each interest rate to an effective annual rate.

(d) Compare them by using the published annual rates.

[**3**] Q4. Interest rates or rates of return on investment that have been adjusted for the effects of inflation are called:

(a) Real rates. (b) Nominal rates. (c) Effective rates. (d) Stripped rates.

[**3**] Q5. The rate of return earned by an investor who purchases a bond today and holds it for the remainder of the term is called the:

(a) Coupon rate. (b) Compound rate. (c) Yield to maturity. (d) Yield to market.

[**3**] Q6. Which of the following is true about the differences between debt and common stock?

(a) Debt is ownership in a firm but equity is not.

(b) Creditors have voting power while stockholders do not.

(c) Periodic payments made to both are tax deductible for the issuer.

(d) Interest payments are promised while dividend payments are not.

[**3**] Q7. Koji invested \$3,300 at 7.75% interest. After a period of time he withdrew \$9,383.31. How long did Koji have his money invested?

$$PV = (3,300); \quad I/Y = 7.75; \quad FV = 9,383.31; \quad CPT\ N = \mathbf{14}$$

(a) 13 years. (b) 14 years. (c) 15 years. (d) 16 years.

[**3**] Q8. You need to borrow \$18,000 to buy a truck. The current loan rate is 9.9% compounded monthly and you want to pay the loan off in equal monthly payments over five years. What is the size of your monthly payment?

$$PV = (18,000); \quad I/Y = \frac{9.9}{12} = .825\%; \quad FV = 0; \quad N = 5 \cdot 12 = 60;$$

$$CPT\ PMT = \mathbf{381.56}$$

(a) \$363.39. (b) \$374.04. (c) \$381.56. (d) \$394.69.

PART B: WRITTEN PROBLEMS (2 QUESTIONS - 22 MARKS)

[8] Q9. **Bonds**

[4] (a) A General Co. bond has an 8 percent coupon and pays interest annually. The face value is $1,000 and the current market price is $1,020.50. The bond matures in 20 years. What is the yield to maturity?

$$PV = (1,020.50); \quad PMT = .08 \cdot 1000 = 80; \quad FV = 1000; \quad N = 20;$$

$$CPT\ I/Y = \mathbf{7.79\%}$$

[4] (b) Sara wants to buy a zero coupon bond that will pay her $1,000 ten years from today. How much should Sara pay today to buy this bond if she wants to earn 7.5% on her investment?

$$FV = 1000; \quad I/Y = 7.5; \quad N = 10;$$

$CPT\ PV = (485.19)$, ie. Sara should pay **$485.19** today.

[**14**] Q10. **Stocks**

[4] (a) The Brown Company just announced that it will be increasing its annual dividend to $1.68 next year and that future dividends will be increased by 2.5% annually. How much would you be willing to pay for one share of the Brown Company stock if you require a 12% rate of return?

$$P_0 = \frac{D_1}{r-g} = \frac{1.68}{.12-.025} = \$\mathbf{17.68}$$

[4] (b) The common stock of J. K. Laminates sells for $32.60 a share. The stock is expected to pay $2.10 per share next month when the annual dividend is distributed. J. K.'s has established a pattern of increasing its dividends by 3.5 percent annually and expects to continue doing so. What is the market rate of return on this stock?

$$R = \frac{D_1}{P_0} + g = \frac{2.10}{32.60} + .035 = \mathbf{9.94\%}$$

[6] (c) Massey Motors is a new firm in a rapidly growing industry. The company is planning on increasing its annual dividend by 10 percent a year for the next 3 years and then decreasing the growth rate to 4 percent per year. The company just paid its annual dividend in the amount of $1.00 per share. What is the current value of one share of this stock if the required rate of return is 13.75 percent?

$D_0 = 1.00;$
$D_1 = 1.00 \cdot 1.1 = 1.10;$
$D_2 = 1.10 \cdot 1.1 = 1.21;$
$D_3 = 1.21 \cdot 1.1 = 1.33;$
$D_4 = 1.33 \cdot 1.04 = 1.38;$

$$\Rightarrow P_3 = \frac{D_4}{r-g} = \frac{1.38}{.1375-.04} = 14.20$$

$$\therefore P_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{P_3}{(1+r)^3}$$

$$= \frac{1.10}{1.1375} + \frac{1.21}{1.1375^2} + \frac{1.33+14.20}{1.1375^3} = \mathbf{\$12.45}$$

[8] Q11. **BONUS QUESTION (8 MARKS)**

[2] (a) You are 25 years old in 2009, and you will save for retirement until you are 65. Assuming inflation will be 2% per year during this period, how much money do you need to save by 2049 to buy at that time an equivalent basket of goods and services worth $1 Million CAD in 2009 dollars?

$PV = 1,000,000$; $N = 65 - 25 = 40$; $I/Y = 2\%$; $\therefore CPT\ FV =$ **2,208,040**.

[2] (b) How much per month do you need to deposit into a balanced portfolio of equal-weighted Canadian stocks (which average 9.8% per year), and bonds (which average 8.4%) to have saved amount in (a) by 2049?

**** 1 mark for correct monthly return, 1 mark for correct PMT ****

$$\text{yearly } r = \frac{9.8\% + 8.4\%}{2} = 9.1\% \quad \Rightarrow \quad \text{monthly } r = 1.091^{1/12} - 1 = .0073 = \textbf{.73\%}$$

$N = 40 \times 12 = 480$; $PV = 0$; $FV = 2,208,040$ (from a);

$\therefore CPT\ PMT =$ **(506.44)**.

[2] (c) Instead, what amount of money do you need by 2049 if you wanted to buy at that time an 8% perpetuity paying 100,000 $/year, ie. "living off interest"? How much do you need to deposit monthly in this case?

**** 1 mark for correct perpetuity, 1 mark for correct PMT ****

$$FV = \text{ price of 8\% perpetuity in 2049 } = \frac{100,000}{.08} = \textbf{1,250,000};$$

$N = 480$; $I/Y = .73\%$ (from b); $PV = 0$; $\therefore CPT\ PMT =$ **(286.70)**.

[2] (d) What monthly savings amount in (c) would you need if you plan to live until 85 and not leave anything to your estate? You can earn an 8% return after retirement.

this problem involves two annuities (** 1 mark for each **), one from 65 to 85 instead of perpetuity as in (d), and another from 25 to 65 similar to (b) and (c).

(i) $N = 20$; $I/Y = 8\%$; $FV = 0$ (nothing left to your estate at age 85);
$PMT = 100,000$; $CPT\ PV =$ **981,815**.

(ii) $N = 480$; $I/Y = .73\%$; $FV = 981,815$; $PV = 0$; $\therefore CPT\ PMT =$ **(225.19)**.