

MGT 890
Valuation and Options
Midterm Exam Solutions
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Question 1

Given:

$$r_1 = 5.00\%$$

$$r_2 = 5.40\%$$

$$r_3 = 5.70\%$$

$$r_4 = 5.90\%$$

$$r_5 = 6.00\%$$

(A)

$$(1 + r_1) = (1 + f_1)$$

$$f_1 = 5\%$$

$$(1 + r_2)^2 = (1 + f_1)(1 + f_2)$$

$$(1.054)^2 = (1.05)(1 + f_2)$$

$$f_2 = 5.8\%$$

$$(1 + r_3)^3 = (1 + f_1)(1 + f_2)(1 + f_3)$$

$$(1.057)^3 = (1.05)(1.058)(1 + f_3)$$

$$f_3 = 6.3\%$$

$$(1 + r_4)^4 = (1 + f_1)(1 + f_2)(1 + f_3)(1 + f_4)$$

$$(1.054)^4 = (1.05)(1.058)(1.063)(1 + f_4)$$

$$f_4 = 6.5\%$$

$$(1 + r_5)^5 = (1 + f_1)(1 + f_2)(1 + f_3)(1 + f_4)(1 + f_5)$$

$$(1.054)^5 = (1.05)(1.058)(1.063)(1.065)(1 + f_5)$$

$$f_5 = 6.4\%$$

(B)

$$(50/1.05) + (1050/(1.054)^2) = 992.79$$

$$(50/1.05) + (50/(1.054)^2) + (50/(1.057)^3) + (50/(1.059)^4) + (1050/(1.06)^5) = 959.34$$

$$(100/1.05) + (50/(1.054)^2) + (100/(1.057)^3) + (100/(1.059)^4) + (1100/(1.06)^5) = 117.43$$

Question 2

- (a) $NPV = -\$2,000,000 + (\$2,000,000 \cdot (1.05)) / (1.05) = 0$
(b) $NPV = -\$900,000 + (\$900,000 \cdot (1.07)) / (1.10) = -\$24,545.45$
(c) $NPV = -\$2,000,000 + (\$2,000,000 \cdot (1.12)) / (1.12) = 0$
(d) $NPV = -\$1,000,000 + (\$1,100,000) / (1.12) = -\$17,857.14$

Investments (a) and (c) are only non-negative NPV projects available. Take (a) or (c).

Question 3

- (a) $NPV = 100,000$
(b) $NPV = 180,000 / (1.12)^5 = 102,137$
(c) $NPV = 11,400 / 0.12 = 95,000$
(d) $NPV = 19,000 / (0.12) [1 - 1 / (1.12)^{10}] = 107,350$
(e) $NPV = 65,000 / (0.12 - 0.05) = 92,857$

Take (d).

Question 4

Using 10% discounting:

$$P_A = 10 / 0.1 = 100$$

$$P_B = 5 / (0.1 - 0.04) = 83.33$$

$$P_C = 5 / (1.1) + 6 / (1.1)^2 + 7.2 / (1.1)^3 + 8.64 / (1.1)^4 + 10.37 / (1.1)^5 + 12.44 / (1.1)^6 + [12.44 / 0.1] / (1.1)^6 = 104.50$$

At 10%, Stock C is most valuable.

Using 7% discounting

$$P_A = 10 / 0.07 = 142.86$$

$$P_B = 5 / (0.07 - 0.04) = 166.67$$

$$P_C = 5 / (1.07) + 6 / (1.07)^2 + 7.2 / (1.07)^3 + 8.64 / (1.07)^4 + 10.37 / (1.07)^5 + 12.44 / (1.07)^6 + [12.44 / 0.07] / (1.07)^6 = 156.48$$

At 7%, Stock B is most valuable.

Question 5

Given:

$$\text{EPS} = 5$$

Investment \$3

20%

$$r = 12\%$$

Need P and E/P

$$20\% * \$3 = \$0.6$$

$$\text{NPV} = -3/1.12 + [(0.6/0.12)*(1/1.12)] = 1.79 \text{ (equal to } 2/1.12)$$

$$2^{\text{nd}} \text{ Outlay NPV} = -3/(1.12)^2 + 1/(1.12)^2 * 0.60/0.12 = 1.59 \text{ (equal to } 2/(1.12)^2)$$

$$\text{PVGO} = 2/(1.12) + 2/(1.12)^2 + 2/(1.12)^3 + 2/(1.12)^4 + 2/(1.12)^5 = 7.21$$

$$P_0 = \text{EPS}/r + \text{PVGO} = 5/.12 + 7.21 = \$48.88$$

$$\text{EPS}/P_0 = 5/48.88 = 10.2\%$$

R=0.20, then NPV =0 because the ROI equals the required return. Therefore, PVGO would be zero.

$$P_0 = \text{EPS}/r + 0 = 5/.20 = \$25$$

$$\text{EPS}/P_0 = 5/25 = 20\%. \text{ QED.}$$

Question 6

First Scenario:

Cash outlay = \$250,000 (outflow) in each of years 1 and 2

Inflow = \$650,000 in year 3

Second Scenario:

Cash outlay = \$550,000 (outflow) in year 1

Inflow = \$650,000 in year 2

Difference:

	Yr. 1	Yr. 2	Yr. 3
Scenario 1:	-250K	-250K	+650K
Scenario 2:	-550K	+650K	0
Difference (2) – (1)	-300K	+900K	-650K

IRRs = 21.1%, 78.8%

Question 7

(A)

$$PV \text{ Yr. 3} = C/r[1-(1/(1+r)^T)] = 12/0.1[1/(1.10)^{10}] = 73.73$$

$$PV \text{ Yr. 0} = 73.73/(1.10)^3 = 55.40$$

(B)

$$FV \text{ 9 months from now} = 55.40*(1.10)^{(9/12)} = 59.91$$