(With Marking Scheme)

FM 2555A – Fall 2016
Solutions to Assignment No. 3
(Questions assigned for submission)

♣Required Assignment Question 1 (Problem [22/246]) [11 points]
An oil company executive is considering investing $10 million in one or both of two wells: well 1 is expected to produce oil worth $3 million a year for 10 years; well 2 is expected to produce $2 million for 15 years. These are *real* (inflation-adjusted) cash flows.

The beta for *producing wells* is 0.9. The market risk premium is 8%, the nominal risk-free interest rate is 6%, and expected inflation is 4%.

The two wells are intended to develop a previously discovered oil field. Unfortunately, there is still a 20% chance of a dry hole in each case. A dry hole means zero cash flows and a complete loss of the $10 million investment. Ignore taxes.

a. What is the correct real discount rate for cash flows from developed wells? [3pts]
b. The oil company executive proposes to add 20 percentage points to the real discount rate to offset the risk of a dry hole. Calculate the NPV of each well with this adjusted rate? [3 pts]
c. What do you say the NPVs of the two wells are? [2 pts]
d. Is there a single fudge factor that could be added to the discount rate for developed wells that would yield the correct NPV for both wells? [2 pts]

SOLUTION:

3 a. Since the risk of a dry hole is unlikely to be market related, we can use the same discount rate as for producing wells.

Recall ⊛ CAPM ⊛ equation describing relation between real nominal and inflation.

$r_{nominal} = .06 + .9(.08)$

1.5 $r_{nominal} = .1320$, or 13.20%

1.5 $r_{real} = (1 + .1320) / (1 + .04) - 1$

$r_{real} = .0885$, or 8.85%

3 b. Based on the executive's proposal:

Use discount factor of (20% + r_{real}) ↑ from (a).

Calculate NPV for wells 1 & 2.

0.5 Discount rate = .0885 + .20 = .2885

1.25 $NPV_1 = -\$10 \text{ million} + \$3 \text{ million} \times ((1 / .2885) - \{1 / [.2885(1 + .2885)^{10}]\})$

$NPV_1 = -\$424{,}743$

1.25 $NPV_2 = -\$10 \text{ million} + \$2 \text{ million} \times ((1 / .2885) - \{1 / [.2885(1 + .2885)^{15}]\})$

$NPV_2 = -\$3{,}221{,}502$

Calculate expected annual income (use appropriate probabilities) for 10 years & 15 years, resp.

2 c. Expected income from Well 1: [(0.2 × 0) + (0.8 × 3 million)] = $2.4 million 0.25

Expected income from Well 2: [(0.2 × 0) + (0.8 × 2 million)] = $1.6 million 0.25

Discounting at 8.85%: Get NPV: don't forget initial outlay

0.75 $NPV_1 = -\$10 \text{ million} + \$2.4 \text{ million} \times ((1 / .0885) - \{1 / [.0885(1 + .0885)^{10}]\})$

$NPV_1 = \$5{,}507{,}230$ annuity factor

0.75 $NPV_2 = -\$10 \text{ million} + \$1.6 \text{ million} \times ((1 / .0885) - \{1 / [.0885(1 + .0885)^{15}]\})$

$NPV_2 = \$3{,}015{,}074$

[not expected NPV; -.5 if this is the one]

2 d. For Well 1, one can certainly find a discount rate (and hence a "fudge factor") that, when applied to cash flows of $3 million per year for 10 years, will yield the correct NPV. Similarly, for Well 2, one can find the appropriate discount rate. However, these two "fudge factors" will be different. Specifically, Well 2 will have a smaller "fudge factor" because its cash flows are more distant. With more distant cash flows, a smaller addition to the discount rate has a larger impact on present value.

∴ no single fudge factor

1 for reasoning

$NPV_1 = A$ ← = 3 million. Is there an appropriate fudge factor to get this? Yes

$NPV_2 = B$ ← = 2 million Same question? Yes (smaller fudge factor) bec of distant cashflows

Will the 2 fudge factors be the same?

1.75 for correct answer

0.25 for explanation

similar to [13/353]

♣Required Assignment Question 2 (Problem [18/353]) [6 points]

The Table below (Column 2) shows the monthly return on the British FTSE 100 index from June 2013 through January 2015. Columns 3 and 4 show returns on the stocks of two firms – Executive Cheese and Paddington Beer. Both firms announced their earnings in January 2015. Calculate the average abnormal return of the two stocks during the month of the earnings announcement.

Month	Market Return	Executive Cheese Return	Paddington Beer Return
Jun – 13	-5.6	-3.2	-9.2
Jul	6.5	6.1	7.3
Aug	-3.1	2.0	-6.7
Sep	0.8	0.4	0.5
Oct	4.2	2.7	7.3
Nov	-1.2	-2.3	-4.9
Dec	1.5	1.4	1.8
Jan – 14	-3.5	-3.8	-5.0
Feb	4.6	4.0	5.6
Mar	-3.1	-4.2	-5.7
Apr	2.8	1.3	4.5
May	1.0	0.9	0.5
Jun	-1.5	-1.4	-0.7
Jul	-0.2	-0.3	-0.8
Aug	1.3	1.6	2.2
Sep	-2.9	-2.4	-6.4
Oct	-1.2	-0.9	-0.8
Nov	2.7	2.3	3.4
Dec	-2.3	-1.7	-2.3
Jan – 15	4.0	5.7	4.1

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SOLUTION:

Using the regression analysis function of an electronic spreadsheet program, calculate the alpha and beta for each security. The regressions are in the following form:

(1) Security return = alpha + (beta × market return) + error term

Run regression analysis using Excel OR other stat software (e.g. R to get estimates for α and β, i.e., $\hat{\alpha}$ and $\hat{\beta}$.

The results are:

0.75 for each correct estimate

	Alpha	Beta
Executive Cheese	0.1176	0.78
Paddington Beer	-0.8095	1.45

The abnormal return for Executive Cheese in January 2015 was:

Use appropriate equations Chapter 13 – Slide # 13-15

$5.7 - [0.1176 + 0.78 \times 4.0] = 2.46\%$ (0.5)

For Paddington Beer, the abnormal return was:

$4.1 - [-0.8095 + 1.45 \times 4.0] = -0.89\%$ (0.5)

Thus, the average abnormal return of the two stocks during the month of the earnings announcement was 0.79%. (0.5)

♣Required Assignment Question 3 (not in the textbook) [4 points]

A project has an expected cash flow of \$300 in year 3. The risk-free rate is 5 percent, the market risk premium is 8 percent, and the project's beta is 1.25. Calculate the certainty equivalent cash flow for year 3, CEQ_3.

CAPM. to calculate cost of capital. refer to slide # 9.29.

SOLUTION:

$r = 5\% + (1.25 \times 8) = 15\%$ (2)

$CEQ_3 = (300/1.15^3) \times (1.05)^3 = 228.35.$ (2)

For each stock, Calculate

Expected return = actual stock return − expected return

↑ CAPM.

Then get average of abnormal returns during the month of the earnings announcement.