commerce undergraduate society

# COMM 298 INTRO TO FINANCE
# 2016 WINTER TERM2 [FINAL]

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CMP

Question 1.

a. Please refer to the table below:

| Year | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Cash flow | -100,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| Cumulative future cash flows | | 25,000 | 50,000 | 75,000 | 100,000 | 125,000 |
| Discounted cash flow | | 22,936 | 21,042 | 19,305 | 17,711 | 16,248 |
| Cumulative discounted future cash flows | | 22,936 | 43,978 | 63,282 | 80,993 | 97,241 |

The payback is 4 years.
Discounted payback is greater than 5 years.

b. NPV is computed as:

$$NPV = -100000 + \sum_{i=1}^{5} \frac{25000}{(1+r)^i}$$
$$= -100000 + \frac{25000}{0.09}\left(1 - \frac{1}{(1+0.09)^5}\right)$$
$$= -2758.72$$

c. IRR is found by solving:

$$NPV = -100000 + \sum_{i=1}^{5} \frac{25000}{(1+r)^i} = 0$$

OR

$$-100000 + \frac{25000}{r}\left(1 - \frac{1}{(1+r)^5}\right) = 0$$

Using trial and error or Excel or a financial calculator, the solution is: IRR = 7.93%

d. Because NPV<0, IRR<9%, and discounted payback > 4, we should not accept the project. NPV and IRR should be the primary decision methods.

Question 2.

a. NPV is computed as:

$$\text{NPV} = -1000000 + \sum_{i=1}^{8} \frac{200000}{(1+r)^i}$$
$$= -1000000 + \frac{200000}{0.12}\left(1 - \frac{1}{(1+0.12)^8}\right)$$
$$= -6472.05$$

Since NPV<0, we should not take on the project.

b. IRR is found by solving:

$$\text{NPV} = -1000000 + \sum_{i=1}^{8} \frac{200000}{(1+r)^i} = 0$$

OR

$$-1000000 + \frac{200000}{r}\left(1 - \frac{1}{(1+r)^8}\right) = 0$$

Using trial and error or Excel or a financial calculator, the solution is: IRR = 11.81%
Since IRR<12%, we should not take on the project.

c. The two decision rules, NPV and IRR yield the same conclusion above. This happens when the project is a conventional project which has only one negative cash flow at the beginning.

Question 3.

Current price $P_0$ = 2, dividend next year $D_1$ = 0.20, price one year from now depends on whether they find gold or not:

$$P1 = \begin{cases} 3, \text{ if find gold (0.5 probability)} \\ 1.5, \text{ if not find gold (0.5 probability)} \end{cases}$$

Then return can be calcualted as:

$$R = \frac{D1 + E\,[P1] - P0}{P0} = \begin{cases} \frac{0.2+3-2}{2} = 0.6, \text{ if find gold (0.5 probability)} \\ \frac{0.2+1.5-2}{2} = -0.15, \text{ if not find gold (0.5 probability)} \end{cases}$$

Then expected return is:

E [R] = 0.5 * 0.6 + 0.5 * (-0.15) = 0.225

Question 4.

a. The expected return for Pixie will be:

$E[R] = \sum_{all\ r} rp(r)$
$= -0.05\ (0.10) + 0.00\ (0.15) + 0.10\ (0.50) + 0.15\ (0.15) + 0.20\ (0.10)$
$= 8.75\%$

b. The variance of Pixie's return will be:

$\sigma^2 = \sum_{all\ r} \left(r - E(R)\right)^2 p(r)$
$= (-0.05 - 0.0875)^2\ (0.10) + (0.00 - 0.0875)^2\ (0.15) + (0.10 - 0.0875)^2\ (0.50) + (0.15 - 0.0875)^2\ (0.15) + (0.20 - 0.0875)^2\ (0.10)$
$= 0.00496875$

The standard deviation of Pixie's return will be:

$\sigma = \sqrt{0.00496875} = 7.05\%$

c. So the updated distribution should be:

| r | p(r) |
|---|---|
| 0.00 | 0.10 |
| 0.05 | 0.15 |
| 0.15 | 0.50 |
| 0.20 | 0.15 |
| 0.25 | 0.10 |

Based on the updated distribution, you can carry out the similar calculation as in (a) and (b) to find the new E (R) and σ.

There is a shortcut though. We know that if X is random and a is constant, then
$E\ (a+x) = a + E\ (x)$
$Var\ (a+x) = Var\ (x)$

Hence
$E\ (R + 0.05) = E\ (R) + 0.05 = 0.0875 + 0.05 = 0.1375$
$Var\ (R + 0.05) = Var\ (R) = 0.00496875$
$\sigma = \sqrt{0.00496875} = 7.05\%$

Question 5.

a. According to CAPM, the stock's expected return is:

$E(R) = r_f + \beta(E(R_M) - r_f)$

$= 0.04 + 1.6*0.1$

$= 20\%$

b. The realized return formula is:

$R = \frac{P1-P0+D1}{P0}$

Taking expectation of both sides, we have:

$E(R) = E\left(\frac{P1-P0+D1}{P0}\right)$

$= \frac{E(P1)-P0+D1}{P0}$

If the stock price is to remain unchanged over the next year, so that $E(P_1) = P_0$, we have:

$E(R) = \frac{P0-P0+D1}{P0} = \frac{D1}{P0}$

So $D_1 = E(R)P_0 = 0.20*10 = 2.0$

Question 6.

a. By CAPM, expected return on the asset is:

$E(R)=R_f + \beta(E[R_M] - R_f)$
$= 0.04 + 1.5(0.12 - 0.04)$
$= 0.16$

b. The reward/risk ratio is:

$E[R_M] - R_f / \beta_M$
$= E[R_M] - R_f$
= 12% - 4%
= 8%

c. The portfolio expected return is weighted sum of individual expected returns:

$R = 0.4\ E(R) + 0.6\ E(R_M)$
$= 0.4*0.16+0.6*0.12$
$= 0.136$

Question 7.

With the information given, we can find the cost of equity using the dividend growth model. Using this model, the cost of equity is:

$R_E = \frac{D1}{P0} + g$

$= \frac{D0(1+g)}{P0} + g$

$= \frac{2.4*1.055}{52} + 0.055$

= 0.10369231

Question 8.

$WACC = w_E*R_E + w_P*R_P + w_D*R_D$

= (0.6) * 0.14 + (0.05) * 0.06 + (0.35) * 0.08

= 0.115