Review for 4368 Final Part 2

1 Deconstructing Returns from a Bond

1.1 A premium bond (which currently trades at a price higher than face value $1000)

Consider a bond with an annual coupon rate of 10%. The bond pays semiannual coupons (there is a coupon payment every 6 months) and has 8 years until its maturity date. Suppose investors require an annual return of 8% for holding this bond, i.e.,

\[ r_{d\ annual} = 8\% \]

- Observation 1: This bond will be trading at a value greater than its face value of $1000, since annual coupon rate= 10% > \( r_{d\ annual} = 8\% \)
- Observation 2: The 6-month total return from this bond will be 4%.
- Observation 3: If \( r_{d\ annual} \) remains at 8% until the bond’s maturity, the value of this bond will decrease and shrink towards $1000 face value as maturity date comes closer.
- Observation 4: If \( r_{d\ annual} \) remains at 8% until the bond’s maturity, since the bond value is going to be declining, we can conclude from

\[
6\text{-months total return} = 6\text{-months coupon return} + 6\text{-months return due to price change}
\]

that the 6-month coupon return > 4%.
- Observation 5: If \( r_{d\ annual} \) remains at 8% until the bond’s maturity, since the bond value is going to be declining towards $1000, the 6-month coupon return will be increasing towards

\[
\frac{50}{1000} = 5\%.
\]
1.2 A discount bond (which currently trades at a price lower than face value $1000)

Consider a bond with an annual coupon rate of 10%. The bond pays semiannual coupons (there is a coupon payment every 6 months) and has 8 years until its maturity date. Suppose investors require an annual return of 12% for holding this bond, i.e.,

\[ r_{\text{annual}} = 12\% \]

- Observation 1: This bond will be trading at a value less than its face value of $1000, since annual coupon rate = 10% < \( r_{\text{annual}} = 12\% \)
- Observation 2: The 6-month total return from this bond will be 6%.
- Observation 3: If \( r_{\text{annual}} \) remains at 12% until the bond’s maturity, the value of this bond will increase towards $1000 face value as maturity date comes closer.
- Observation 4: If \( r_{\text{annual}} \) remains at 12% until the bond’s maturity, since the bond value is going to be increasing, we can conclude from

\[
\text{6-months total return} = \text{6-months coupon return} + \text{6-months return due to price change}
\]

that the 6-month coupon return < 6%.
- Observation 5: If \( r_{\text{annual}} \) remains at 12% until the bond’s maturity, since the bond value is going to be increasing towards $1000, the 6-month coupon return will be decreasing towards

\[
\frac{50}{1000} = 5\%.
\]
2 Deconstructing Returns from a Stock

2.1 Determinants of a Stock’s Return

The return that investors require for holding a stock is determined through

\[ r_s = r_{RF} + \beta_s (r_M - r_{RF}) \]

where

- \( r_{RF} \) captures the return from the same asset (risk-free rate of return)
- \( \beta_s \) captures the non-diversifiable risk of the stock
- \( r_M \) captures the risk aversion of market participants, since it is the rate of return that investors require for holding the market portfolio (note: Clearly \( r_M \) increases as \( r_{RF} \) increases).

2.2 Decomposition

How the return \( r_s \) described above will be earned can be decomposed into two parts, namely dividend return and the capital gains return, as we have

\[ r_s = \frac{D_0(1+g)}{P_0} + \frac{g}{P_0} \]

where \( D_0 \) is the last dividend, \( g \) captures the dividend growth rate estimate and \( P_0 \) is the current stock price.

2.3 Some Observations

Observation 1: If \( r_{RF}, r_M \) and \( \beta_s \) remain the same, an increase in \( g \) will cause

- the stock price \( P_0 \) to increase
- the dividend return to decrease
- the capital gains return to increase
- but the total return on the stock will remain the same. In other words, the same return will be earned, but more of it will come from capital gains return.
Observation 2: If $r_{RF}, r_M$ and $g$ remain the same, an increase in $\beta_s$ will cause

- the stock price $P_0$ to decrease
- the dividend return to increase
- the capital gains return remain the same
- but the total return on the stock will increase. In other words, a higher return will be required as a result of higher perceived risk, and this extra return will come from dividend return.

Observation 3: If $\beta_s, r_M$ and $g$ remain the same, an decrease in $r_{RF}$ will cause

- the stock price $P_0$ to increase
- the dividend return to decrease
- the capital gains return remain the same
- but the total return on the stock will decrease. In other words, a lower return will be required as a result of safe asset yielding a lower return.

Observation 4: If $r_{RF}, r_M$ remain the same, a decrease in $g$ and an increase in $\beta_s$ will cause

- the stock price $P_0$ to decrease
- the dividend return to increase
- the capital gains return to decrease
- but the total return on the stock to increase. In other words, a higher return will be required, and more of it will come from dividend return.
3 NPV and IRR

Question 1 Consider the following statement, state whether it is true or not, and explain why it is true or not.

Statement: You are evaluating two projects A and B. You can only choose one of the two projects, but not both. You have the following information on net present values of the two projects.

\[ NPV_A < NPV_B \] for cost of capital \( k < 8\% \)
\[ NPV_A > NPV_B \] for cost of capital \( k > 8\% \)

You also know that \( IRR_A = 10\% \). Then, both IRR and NPV methods will always yield the same decision.

Question 2 Consider the following statement, state whether it is true or not, and explain why it is true or not. For full marks, be precise and concise and use a graph.

Statement: You are evaluating two projects A and B. You can only choose one of the two projects, but not both. You have the following information on the IRRs of the two projects

\[ IRR_A = 14\% \] and \( IRR_B = 12\% \)

\[ NPV_A = NPV_B \] at \( k = 10\% \)

If your cost of capital is 8\%, then in this situation NPV criteria will always pick project A.