NBA5420 Problem Set 6 – Fixed Income
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1 A nine-year bond has a yield of 10% and a modified duration of 7.194 years. If the market yield rises by 50 basis points, what is the percentage change in the bond's price?
Answer:
dp/p = -D * dy, When the bond's price will decrease by
dp/p = 50% * 1% * (- 7.194) = dp/p , so dp/p = - 0.03597. So the price will decrease by 3.597%

2 Find the modified duration of a 6% coupon bond making annual coupon payments if it has three years until maturity and has a yield to maturity of 6%.
Answer:
D = 1/(1 + 6%) * [1* (6%/(1 + 6%)(1) +2 * 6%/(1 + 6%)(2) + 3 * 6%/(1 + 6%)(3))]
= 1/ (1.06)*(0.0566 + 0.1068 + 0.151) = 0.2966

3 The following questions are from past CFA examinations:
A 6% coupon bond paying interest annually has a modified duration of 10 years, sells for $800, and is priced at a yield to maturity of 8%. If the YTM increases to 9%, the predicted change in price, using the duration concept, decreases by:
(a) which is the duration of the asset
Answer: iv) $80.00
dp/p = -10 * 1% = dp/p = -10%, dp = -10% * 800 = -80, pNow = 800 - 80 = 720

(b)A 6% coupon bond with semiannual coupons has a convexity (in years) of 120, sells for 80% of par, and is priced at a yield to maturity of 8%. If the YTM increases to 9.5%, the predicted contribution to the percentage change in price, due to convexity, would be:
Answer: ii) 1.35%
dp/p = - D* dy + 0.5*convexity* dy(2)
so 0.5 * 120 * 1.5%(2) = 1.35%

c) When interest rates decline, the duration of a 30-year bond selling at a premium:
Answer: i) increases.
Increase. When Interest decline. The yield should increase, then duration should increase

d) Which bond has the longest duration?The longer year and less yield
Answer: iii) 15-year maturity, 6% coupon.
duration
– increases with maturity
– decreases with higher coupon rate
– decreases with higher YTM

4 Assuming that all the simplifying assumptions of the expectations theory of the term structure hold, find the actual market three-year rate (r0,3) and the expected one-year rate for next year (Er1,2) and three years from now (Er3,4).
Answer: use the short term formula to calculate the answer for the
r03 = (1 + E12)(1 + E23)(1 + r0,1)(1/3) = 0.0467 = 4.67%
Er1,2 = (1 + r02)(2)/(1 + r0,1) - 1 = 5%
Er3,4 = (1 + r0,4)(4) /(1 _ r0,3)(3) - 1 = 0.0601 = 6.01%

5 According to the liquidity-preference theory, what can be said about the implied future (forward) one-year rate two years from today that can be calculated from the term structure?
Answer: a)It will be higher than the market-expected future one-year rate.
“liquidity premium”: Long-term bonds less liquid and pay a higher interest rates relative to the Expectations Hypothesis

6Descending yield curves are likely to be characteristic of periods when expectations are that future interest rates
Answer: d)will fall.
Downward (upward) sloping means expectation for future interest rates to be falling (rising)