DEBT SECURITIES (FIN5DBS), SEMESTER 1, 2012 – ADDITIONAL QUESTION FOR TUTORIAL 4

On November 15th 2011, Origin Energy Limited announced an issue of Origin Energy Notes aimed at raising $500 million for joint venture funding of a liquefied natural gas (LNG) project. The Origin Energy Notes are unsecured, subordinate floating rate notes, issued with a $100 par value and a 60-year maturity term. The coupon interest rate for the notes is determined in advance based on a 4.00% (400 basis point) margin above the prevailing 90-day Bank Bill Rate. The 90-day Bank Bill Rate on December 20th 2011 was 4.80%, and assume for simplicity that it will remain constant at this rate, on average, into the future. Coupon interest will be paid quarterly in arrears on March 20th, June 20th, September 20th and December 20th each year. The notes were issued on December 20th 2011 and mature on December 20th 2071, although they were issued with a redemption clause allowing Origin Energy Limited to redeem the notes at par value on the fifth anniversary of the issue date (December 20th 2016) or on any payment date thereafter. There is also a step-up provision associated with the notes, where the margin payable will increase by 1.00% per annum if the notes have not been redeemed by December 20th 2036 (25 years after the issue date). At the time of issue of the Origin Energy Notes they were priced in the market to yield 8.20% on a bond equivalent annual basis. The required yield for the bonds is expected to remain constant in the absence of firm-specific events impacting on Origin Energy Limited's operating activities or credit rating.

Required:

a) What price should you have been prepared to pay to purchase the Origin Energy Notes on the initial issue date, assuming that your risk assessment of the notes is in line with that of the market and you expect Origin Energy Limited to redeem the notes on the first available call date of December 20th 2016?

b) Would your purchase price for the Origin Energy Notes be any different if you did not expect redemption of the notes by Origin Energy Limited prior to the scheduled maturity date of December 20th 2071?

c) It is now December 20th 2021, the tenth anniversary of the issue of the Origin Energy Notes, and Origin Energy Limited announces that one of its joint venture partners, ConocoPhillips, is pulling out of involvement in the project. You believe that this will significantly impact on the ongoing feasibility and profitability of the project, and also increase the uncertainty of Origin Energy Limited being able to meet payment obligations on these Notes. If you adjust your required return on Origin Energy Notes to 9.20% per annum in response to this information, what is the highest purchase price that you would be prepared to pay to purchase the Origin Energy Notes on this date (December 20th 2021), if you do not expect redemption prior to the scheduled maturity date?

SOLUTION TO ADDITIONAL QUESTION FOR TUTORIAL 4

a)
Quarterly coupon payment = (0.088/4)($100) = $2.20
Quarterly discount rate = 0.082/4 = 0.0205 (2.05%)
Number of compound periods = 5 × 4 = 20

$$B_0 = \$2.20\left[\frac{1-1/(1.0205)^{20}}{0.0205}\right] + \frac{\$100}{(1.0205)^{20}} = \$35.8002 + \$66.6407 = \$102.4409$$

Thus, the price you should be prepared to pay to buy the bond is $102.4409. Note that this bond is price above its par value because the coupon interest rate is greater than the discount rate.

b)
Quarterly coupon payment = $2.20 until quarter 100
Quarterly coupon payment = (0.098/4)($100) = $2.45 from quarter 101 to quarter 240
Total number of coupon periods = 240

$$B_0 = \$2.20\left[\frac{1-1/(1.0205)^{100}}{0.0205}\right] + \$2.45\left[\frac{1-1/(1.0205)^{140}}{0.0205}\right]/(1.0205)^{100} + \frac{\$100}{(1.0205)^{240}} = \$93.2122 + \$14.7908 + \$0.7671 = \$108.7701$$

Thus, the bond price is higher in this case at $108.7701, which is consistent with higher cash flows due to the effects of the step-up coupon provision.

c)
Quarterly coupon payment = $2.20 until quarter 60
Quarterly coupon payment = $2.45 from quarter 61 to 200
Total number of coupon periods = 200
Quarterly discount rate = 0.092/4 = 0.0230 (2.30%)

$$B_0 = \$2.20\left[\frac{1-1/(1.0230)^{60}}{0.0230}\right] + \$2.45\left[\frac{1-1/(1.0230)^{140}}{0.0230}\right]/(1.0230)^{60} + \frac{\$100}{(1.0230)^{200}} = \$71.2090 + \$26.0928 + \$1.0589 = \$98.3607$$

In this case, the bond is priced at less than the par value. This is because the discount rate is greater than the coupon interest rate provided by the bond during the first 15 years (60 quarters) when the coupon payments carried higher time values.