MATH 373
Quiz 5
Fall 2018
November 20, 2018

1. A callable bond matures at the end of 20 years for 10,000. The bond pays coupons at a rate of 7% convertible semi-annually.

   The bond can be called at the end of 14 year for a call value of 10,500. The bond can be called at the end of 16 years for a call value of 10,350. Finally, the bond can be called at the end of 18 years for a call value of 10,200.

   Determine the price of this callable bond to yield a return of 7% convertible semi-annually.

   Solution:

I/Y	N	FV	PMT	CPT PV
7/2=3.5	14*2=28	10,500	(10,000)(0.07/2)=350	10,190.83
3.5	32	10,350	350	10,116.41
3.5	36	10,200	350	10,057.97
3.5	40	10,000	350	10,000.00

   Price is 10,000 since that is the lowest price.

2. The stock of Bray Industries pays a quarterly dividend with the next dividend payable in 2 months. The first dividend will be 10. The second dividend will be 11. The third dividend will be 12. Each dividend will follow the same pattern with each dividend being 1 greater than the prior dividend.

   Using the dividend discount method, determine the price to yield 10% compounded quarterly.

   Solution:

   We need $\frac{i^{(4)}}{4}$. We are given that $i^{(4)} = 0.10$ so $\frac{i^{(4)}}{4} = 0.025$.

$$PV = \left(\frac{10}{0.025} + \frac{1}{(0.025)^2} \right)(1.025)^{1/3} = 2016.53$$

   We multiply by $(1.025)^{1/3}$ because the first divdend is paid at the end of two months.

3. The stock of Crouthamel Company pays quarterly dividends with the next dividend of 4 being paid later today. Each dividend thereafter increases 1.5% of the prior dividend. In other words, the second dividend at the end of three months will be $4(1.015)$. The third dividend paid at the end of six months will be $4(1.015)^2$, etc.

   Using the dividend discount method, determine the price of Crouthamel stock at an annual effective discount rate of 12%.

   Solution:

   We need $\frac{i^{(4)}}{4}$. We are given that $i = 0.12$ so $\frac{i^{(4)}}{4} = (1.12)^{0.25} - 1 = 0.028737345$

   $$PV = 4 + 4(1.015)(1.028737345)^{-1} + 4(1.015)^2(1.028737345)^{-2} + \ldots$$

   $$= \frac{4-0}{1-(1.015)(1.028737345)^{-1}} = 299.55$$

   Because of poor wording, some students interpreted the question to say that $d = 0.12$. Then

   $$i = \frac{d}{1-d} = \frac{0.12}{1-0.12} = 0.136363636 \Longrightarrow \frac{i^{(4)}}{4} = (1.136363636)^{0.25} - 1 = 0.032474494$$

   $$PV = 4 + 4(1.015)(1.032474494)^{-1} + 4(1.015)^2(1.032474494)^{-2} + \ldots$$

   $$= \frac{4-0}{1-(1.015)(1.032474494)^{-1}} = 236.34$$