Bond M has face value of $40,000 & matures in 20 years, makes no payments for 1st 6 years, then $1500 every 6 months for 8 years, then pays $1800 every 6 months for last 6 years. Bond N has face value of $40,000 & maturity 20 years & makes no coupon payments over the life of the bond. Required rate on both is 12% compounded semiannually, what is the current price of each bond?

Solution.

Consider bond M. Discount rate is ${}^{0.12}/_{2} = 0.06$ for semi-annual and total numbers of periods is $20 \text{ years } \cdot 2 \text{ (per year)} = 40$.

So

Cash flows for periods **1-12**: 0.

Cash flows for periods **13-28**:

$$\frac{\$1500}{(1+0.06)^{13}} + \frac{\$1500}{(1+0.06)^{14}} + \cdots + \frac{\$1500}{(1+0.06)^{28}} = \sum_{i=13}^{28} \frac{\$1500}{(1+0.06)^{i}} = \$7533.48$$

Cash flows for periods **29-39**:

$$\frac{\$1800}{(1+0.06)^{29}} + \frac{\$1800}{(1+0.06)^{30}} + \cdots + \frac{\$1800}{(1+0.06)^{39}} = \sum_{i=29}^{39} \frac{\$1800}{(1+0.06)^{i}} = \$2777.24$$

And final payment is par plus the last coupon payment:

$$\frac{\$40000 + \$1800}{1.06^{40}} = \$4063.89$$

Price is the sum of all the discounted cash flows:

$$PV_M = \$7533.48 + \$2777.24 + \$4063.89 = \$14374.61$$

Consider bond N. We have only one cash flow – at maturity.

So

$$PV_N = \frac{40000}{1.06^{40}} = \$3888.89$$

Answer: $PV_M = \$14374.61;\ PV_N = \$3888.89.$