Calculating the Holding Period Return on a Coupon Bond[1]

For zero-coupon bonds, the holding period return (HPR) equals the yield to maturity (YTM) if the bond is held to maturity. Is the same true for coupon bonds?

1. Assume: $T = 4$, $F = \$1000$, $C = \$80$, and YTM $= 8\%$. Therefore the price of the bond $P = \$1000$ (because $C/F =$ YTM, the bond sells at par. The value in 4 years, V_4, depends on the reinvestment rate for the coupons. Let's say we reinvest the coupons at the YTM. Then:

1	2	3	4			
\$80	$\longrightarrow$	$\longrightarrow$	$\longrightarrow$	$\$80(1.08)^3$	=	\$100.78
	\$80	$\longrightarrow$	$\longrightarrow$	$\$80(1.08)^2$	=	\$93.31
		\$80	$\longrightarrow$	$\$80(1.08)$	=	\$86.40
			\$1080	\$1080	=	\$1080
				Total	=	\$1360.49

   Therefore

$$\begin{aligned} \text{HPR} &= \left(\frac{V_4}{V_0}\right)^{\frac{1}{4}} - 1 \\ &= \left(\frac{\$1360.49}{\$1000}\right)^{\frac{1}{4}} - 1 = 0.08 = \text{YTM} \end{aligned}$$

   When the coupons are reinvested at the YTM, then HPR = YTM.

2. What happens when the coupons are not reinvested at the YTM? Suppose instead that the coupons are reinvested at 6%. Then

1	2	3	4			
\$80	$\longrightarrow$	$\longrightarrow$	$\longrightarrow$	$\$80(1.06)^3$	=	\$95.28
	\$80	$\longrightarrow$	$\longrightarrow$	$\$80(1.06)^2$	=	\$89.89
		\$80	$\longrightarrow$	$\$80(1.06)$	=	\$84.80
			\$1080	\$1080	=	\$1080
				Total	=	\$1350

[1]Notes for Finance 604 & 612 prepared by Jessica A. Wachter.

$$\text{HPR} \quad = \quad \left(\frac{\$1350}{\$1000}\right)^{\frac{1}{4}} - 1 = 0.078 < \text{YTM}$$

Because the coupons are reinvested at a rate lower than the YTM, we achieve a lower return.

3. Suppose instead that we reinvest the coupons at a rate greater than the YTM. I leave it to you to show that HPR > YTM when the coupons are reinvested at a higher rate.

What can we conclude? While YTM is a useful yardstick, it is a flawed measure of returns for coupon bonds. HPR = YTM only if we can and do reinvest the coupons at the YTM.

Question: Suppose we sold the coupon bond before maturity? How would we calculate the holding period return in this case?