

Yield to maturity is composed of 2 drivers: 1) Principal appreciation per annum and 2) cost basis yield per annum.

**Assumptions:** 1) We purchased at \$900. 2) Coupon rate is 10%. 3) Matures in 1 year and is a 1 year bond. 4) Market price of bond is \$1000.

- 1) Principal appreciation- same as appreciation in bonds, stocks, real estate
  - A. Let's assume we purchased a bond at 900. It is a 1 year bond and we purchased it the day it was issued. Over the course of the 1 year, it will appreciate from 900 to 1000. That is a 11.11% appreciation.
  - B. Similarly, let's assume we purchased a company for \$900 MM and we sell it after 1 year for \$1 BB. That is the same 11.11% appreciation.
  - C. Also, let's assume we purchased a home for \$900k and we sell it after 1 year for \$1MM. That is also an 11.11% appreciation.
- 2) Cost basis yield- same as return/purchase price of asset, or ROIC for bonds, stocks, real estate
  - A. What is ROIC?
    - i.  $\text{Net income} / \text{Total capital (inclusive of debt, equity)}$
    - ii. Compare ROIC to WACC to see whether the investment is profitable and not better spent elsewhere
  - B. If we receive \$100 with a 10% coupon, the yield at cost, or  $\$100/\$900$  is equal to 11.11%.
    - i. Why do we divide the coupon over cost? If we calculated the par yield, it will equal the coupon. The figure would not be relevant to our holding.
    - ii. What about coupon over market? We can see the **market YTM** by dividing the coupon over market.  $\$100/\$1000=10\%$  is the market basis yield. The YTM for the \$1000 bond would be 10%. We can see the market expectations is 10% percent for 1 year bonds paying out 10% coupon. However, again, this figure is not relevant to our holding if we hold to maturity.
    - iii. If we were to sell the bond before maturity, the market yield is important.
      - A. We would have to calculate the **annualized** 1) interest return 2) principal appreciation.
      - B. If we hold for 6 months and we choose to sell the bond we purchased for \$900 at \$1000, we will see an appreciation of 11.11% in 6 months, or a ~23% annual appreciation. Also, we will have accumulated 6 months of interest, which would be annualized at the coupon rate of 10%. The annualized return would be 33%.
- 3) The YTM for this bond is 22.22%. (11.11% from interest + 11.11% from principal appreciation).

We can see from the 1) treasury yield for zero coupon bonds and 2) credit spreads that the yield investors demand will be determined by a) time horizon and b) risk.

Duration and convexity are good methods to determine the effect of time and market yield changes on the value of the bond. There should be a duration and convexity for stocks and real estate.