

What is Yield to Maturity (YTM)?

Worksheet

Yield to maturity is the internal rate of return (IRR) that equates a bond's current price to the present value of all future cash flows; it represents the effective annual return assuming the bond is held until maturity.

Questions

1. YTM is...

- A) total annual return if held to maturity
- B) coupon payment rate
- C) current bond price
- D) bond's face value

2. Discount bond (price < face value) has...

- A) $YTM > \text{coupon rate}$
- B) $YTM < \text{coupon rate}$
- C) $YTM = 0$
- D) no YTM

3. Premium bond (price > face value) has...

- A) $YTM < \text{coupon rate}$
- B) $YTM > \text{coupon rate}$
- C) $YTM = \text{coupon rate}$
- D) YTM undefined

4. YTM assumes...

- A) bond held to maturity
- B) bond sold immediately
- C) coupons reinvested at YTM rate
- D) both A and C

5. You buy a bond at 950 with 1000 face value, \$50 annual coupon, 10 years to maturity. Approximate YTM?

6. Bond at 1100, $FV=1000$, coupon=\$80/year, 5 years. YTM?

7. Zero-coupon bond: buy at 500, $FV=1000$, 20 years. YTM?

8. Define: What is yield to maturity?

9. Define: YTM vs coupon rate?

10. Define: Higher market price $\rightarrow$ YTM?

Answer Key

1. A) total annual return if held to maturity — YTM is the internal rate of return (IRR) earned if bond is held to maturity.
2. A) $YTM > \text{coupon rate}$ — Investor gains principal appreciation; total return (YTM) exceeds just coupon income.
3. A) $YTM < \text{coupon rate}$ — Investor loses principal at maturity; YTM is lower than coupon rate.
4. D) both A and C — YTM assumes the bond is held to maturity AND coupons are reinvested at YTM rate.
5. Bond price = 950 < 1000 (discount, $YTM > \text{coupon rate}$) Coupon rate = $50/1000 = 5\%$ $950 = \sum [50/(1+YTM)^t] + \$1000/(1+YTM)^{10}$ Approximate $YTM \approx 5.4\%$
6. Bond price = 1100 > 1000 (premium, $YTM < \text{coupon rate}$) Coupon rate = $80/1000 = 8\%$ $1100 = \sum [80/(1+YTM)^t] + \$1000/(1+YTM)^5$ $YTM \approx 6.2\%$
7. No annual coupons; only principal at maturity $500 = 1000/(1+YTM)^{20}$ $(1+YTM)^{20} = 2$ $YTM = 2^{(1/20)} - 1 \approx 3.5\%$
8. Total annual return an investor earns if they hold a bond until maturity.
9. Coupon rate is fixed %; YTM includes price appreciation/depreciation and is market-driven.
10. Lower YTM—fewer gains from price appreciation (or more loss at maturity).

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