

# **An Annual Coupon Bond Pays 8.7% Interest. It Matures In 4 Years With A Face Value Of \$1,000. Yield To**

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When evaluating fixed-income securities, understanding key concepts such as coupon rate, maturity date, face value, and yield to maturity (YTM) is essential for investors aiming to make informed decisions. In this article, we analyze an annual coupon bond that pays an 8.7% interest rate, matures in four years, and has a face value of \$1,000. We will explore what yield to maturity means in this context, how it influences investment returns, and the factors affecting this investment's profitability.

## **Understanding the Bond's Basic Features**

Before delving into yield calculations, it's important to grasp the fundamental attributes of this bond:

### **Coupon Rate and Payments**

- **Coupon Rate:** 8.7% annually
- **Coupon Payment:** \$87 per year (8.7% of \$1,000 face value)
- **Payment Frequency:** Annually

### **Maturity and Face Value**

- **Maturity Period:** 4 years
- **Face Value (Par Value):** \$1,000

## **What Is Yield to Maturity (YTM)?**

Yield to maturity is a crucial concept in fixed-income investing, representing the total return an investor can expect if the bond is held until maturity, assuming all payments are made as scheduled.

and reinvested at the same rate.

## Definition and Significance

1. **Definition:** The internal rate of return (IRR) for the bond's cash flows, including coupon payments and face value repayment.
2. **Significance:** Helps investors compare bonds with different features and market prices, serving as a comprehensive measure of investment return.

## YTM in Practice

YTM considers the bond's current market price, coupon payments, time to maturity, and face value. It essentially answers the question: "What annual rate of return will I earn if I purchase this bond at its current price and hold it until maturity?"

## Calculating Yield to Maturity

The calculation of YTM involves solving for the interest rate in the bond's present value equation:

$$P = \sum_{t=1}^n \frac{C}{(1 + YTM)^t} + \frac{F}{(1 + YTM)^n}$$

Where:

- $P$  = current market price of the bond
- $C$  = annual coupon payment (\$87)
- $F$  = face value of the bond (\$1,000)
- $n$  = number of years to maturity (4)
- $YTM$  = yield to maturity (the unknown we solve for)

Since solving this algebraically can be complex, financial calculators or spreadsheet functions such as Excel's RATE or YIELD are typically used.

## Example Scenario

Suppose the bond is trading at its face value of \$1,000. In this case, the YTM is approximately equal to the coupon rate, which is 8.7%. However, if the bond's market price deviates from \$1,000, the YTM will adjust accordingly:

- Premium Bond: Market price > \$1,000 → YTM < 8.7%
- Discount Bond: Market price < \$1,000 → YTM > 8.7%

Understanding this relationship is vital for investors to assess whether a bond offers a competitive return relative to prevailing interest rates.

## **Factors Affecting Yield to Maturity**

Several factors influence the YTM of a bond, including market interest rates, credit risk, and economic conditions.

### **Market Interest Rates**

- When prevailing market rates rise above the bond's coupon rate, the bond's price falls below face value, increasing YTM.
- Conversely, if market rates decline, the bond's price rises above face value, reducing YTM.

### **Credit Risk**

- Higher credit risk of the issuer leads to a higher YTM to compensate investors for potential default.
- Lower credit risk results in a lower YTM, reflecting increased safety.

### **Time to Maturity**

- The longer the remaining maturity, the more sensitive the bond's price and YTM are to interest rate changes.
- Shorter maturities tend to have less price volatility and YTM fluctuations.

### **Inflation Expectations**

- Higher expected inflation tends to increase YTM as investors seek compensation for reduced purchasing power.
- Stable or low inflation supports lower YTM levels.

# Implications of Yield to Maturity for Investors

Understanding the YTM of an annual coupon bond offers several benefits:

## Investment Decision-Making

- Comparing YTM with alternative investments helps determine if the bond offers a competitive return.
- YTM can guide purchasing decisions—investors prefer bonds with yields that match their risk appetite and return expectations.

## Pricing and Valuation

- YTM is essential in assessing whether a bond is overvalued or undervalued relative to its market price.
- Informed investors can buy bonds at prices that yield their target returns.

## Risk Assessment

- Higher YTM might indicate increased risk or market expectations of rising interest rates.
- Lower YTM suggests market confidence and lower risk premiums.

## Analyzing the Bond's Yield in Context

Given the bond pays 8.7% interest annually and matures in four years with a face value of \$1,000, the key question is: What is the bond's yield to maturity?

### Scenario 1: Bond Trading at Par (\$1,000)

- When the market price equals face value, the YTM approximately equals the coupon rate.
- $YTM \approx 8.7\%$

## **Scenario 2: Bond Trading at a Premium (e.g., \$1,050)**

- Investors pay more upfront for a bond that pays a fixed coupon, resulting in a YTM lower than 8.7%.
- The higher purchase price reduces overall yield.

## **Scenario 3: Bond Trading at a Discount (e.g., \$950)**

- Investors pay less for the bond, which results in a higher YTM than 8.7%.

## **Conclusion: The Importance of Yield to Maturity**

Understanding the yield to maturity of an annual coupon bond is fundamental for making sound investment choices. It encapsulates the expected return, considering the bond's current market price, coupon payments, face value, and time to maturity. Investors should analyze YTM in conjunction with market conditions, credit risk, and inflation expectations to optimize their fixed-income portfolios.

By carefully assessing these factors, investors can determine whether a bond that pays 8.7% annually over four years aligns with their financial goals and risk tolerance. Remember, the YTM is not static; it fluctuates with market dynamics, making ongoing analysis essential for successful bond investing.

In summary:

- The bond pays 8.7% interest annually, with a face value of \$1,000 and a 4-year maturity.
- Yield to maturity provides the comprehensive return expectation.
- Market price relative to face value influences the YTM.
- External factors such as interest rates and credit risk impact the YTM.

Armed with this understanding, investors can better navigate the bond market, optimize their returns, and manage risks effectively.

## **Frequently Asked Questions**

### **What is the annual coupon payment for a bond with an 8.7% interest rate and a \$1,000 face value?**

The annual coupon payment is \$87, calculated as 8.7% of \$1,000.

### **How many years does this bond take to mature?**

The bond matures in 4 years.

## **What does the term 'Yield To Maturity' (YTM) mean in relation to this bond?**

YTM represents the total return an investor can expect if the bond is held until maturity, considering current market price, coupon payments, and face value.

## **If the bond's current market price is \$1,050, how does this affect its yield to maturity?**

The YTM would be lower than the coupon rate since the bond is selling at a premium above face value.

## **How does the bond's maturity period influence its interest rate and yield?**

Longer maturity generally increases interest rate risk, which can influence the bond's yield; in this case, a 4-year period balances risk and return considerations.

## **What is the significance of the bond paying 8.7% interest annually?**

It indicates the bondholder receives 8.7% of the face value (\$1,000) each year as interest, providing predictable income.

## **Can the yield to maturity be higher or lower than the coupon rate? Under what circumstances?**

Yes, YTM can be higher than the coupon rate if the bond is purchased below face value (discount) or lower if purchased above face value (premium).

## **What factors might influence the yield to maturity of this bond over time?**

Market interest rates, credit risk, inflation expectations, and changes in the issuer's creditworthiness can all influence YTM.

## **Is this bond considered a good investment for income-focused investors?**

Yes, with an 8.7% coupon rate, it provides a relatively attractive fixed income, especially if the bond's credit risk is low.

## **How would an increase in interest rates affect the price of this**

## **bond?**

An increase in market interest rates would typically cause the bond's price to decrease, as new bonds would likely offer higher yields.

## **Additional Resources**

### **Annual Coupon Bond: An In-Depth Analysis of Its Features, Valuation, and Yield Dynamics**

In the complex landscape of fixed-income securities, understanding the intricacies of bonds is fundamental for investors seeking to optimize their portfolios. Among these securities, the annual coupon bond stands out as a common instrument that provides regular income streams coupled with face value repayment at maturity. Specifically, an annual coupon bond that pays 8.7% interest, matures in four years, and has a face value of \$1,000 presents a compelling case for examination. Analyzing such a bond involves exploring its key features, valuation methods, and yield calculations, particularly the concept of Yield to Maturity (YTM). This article aims to provide a comprehensive, detailed, and analytical insight into these aspects, equipping investors and financial enthusiasts with a robust understanding of the subject.

## **Understanding the Basic Features of the Bond**

### **1. Coupon Rate and Coupon Payments**

The coupon rate is a fixed percentage of the bond's face value that determines the annual interest payment. In this case, the bond's coupon rate is 8.7%, which means:

- Annual Coupon Payment = 8.7% of \$1,000 = \$87

This payment is made once per year, providing a predictable income stream to the bondholder. The coupon payment is crucial for income-focused investors and serves as a primary component of the bond's cash flows.

### **2. Face Value and Maturity**

The face value, also known as par value, is the amount repaid to the bondholder at maturity. Here, it is set at \$1,000. The maturity period of four years indicates the duration after which the issuer repays the face value, concluding the bond's lifecycle.

- Maturity Date: Four years from issuance
- Final Payment: \$1,000 face value + last coupon payment of \$87

### 3. Payment Frequency and Timing

Since the bond pays interest annually, the bondholder receives one coupon payment each year for four years. The timing of these payments is critical for valuation purposes, especially when calculating the present value of future cash flows.

## Valuation of the Bond: Present Value of Future Cash Flows

Determining the fair value of a bond involves discounting its future cash flows—coupon payments and face value—back to the present using an appropriate discount rate. This rate reflects the market's required yield, considering the bond's risk profile, prevailing interest rates, and other factors.

### 1. Cash Flow Schedule

| Year | Coupon Payment | Principal Repayment | Total Cash Flow |
|------|----------------|---------------------|-----------------|
| 1    | \$87           | \$0                 | \$87            |
| 2    | \$87           | \$0                 | \$87            |
| 3    | \$87           | \$0                 | \$87            |
| 4    | \$87           | \$1,000             | \$1,087         |

### 2. Present Value Calculation

The intrinsic value of the bond (also called its fair price) is calculated as:

Bond Price = Sum of Present Values of all future cash flows

Mathematically:

$$PV = \sum_{t=1}^n \frac{C}{(1 + r)^t} + \frac{F}{(1 + r)^n}$$

Where:

- $C$  = annual coupon payment (\$87)
- $F$  = face value (\$1,000)
- $r$  = discount rate / yield to maturity (YTM)
- $n$  = number of years to maturity (4)

> Note: If the bond is traded at par, its market price equals face value (\$1,000). If traded at a

premium or discount, the price will differ depending on market yields.

### 3. Role of Yield to Maturity (YTM)

YTM is the internal rate of return (IRR) for the bond's cash flows if held until maturity. It represents the annualized return an investor can expect, assuming all payments are made as scheduled and the bond is held to maturity. When the market yield equals the coupon rate, the bond trades at par (\$1,000). If the market yield differs, the bond's price adjusts accordingly.

## Yield to Maturity (YTM): Concept and Calculation

### 1. Defining YTM

Yield to Maturity (YTM) is a comprehensive measure that captures the bond's total return, considering all coupon payments, the face value repayment, and the current market price. It is the discount rate  $(r)$  that equates the present value of the bond's future cash flows to its current market price.

- YTM at Par: When the bond's price equals face value, the YTM equals the coupon rate (8.7% in this case).
- YTM Above Coupon Rate: Indicates the bond is trading at a discount.
- YTM Below Coupon Rate: Indicates the bond is trading at a premium.

### 2. Calculating YTM

Calculating YTM involves solving the following equation:

$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{F}{(1+r)^n}$$

Where  $(P)$  is the current market price of the bond.

Because this equation involves  $(r)$  in both the denominator and exponent, it is typically solved iteratively or using financial calculators or spreadsheet functions like Excel's YIELD function or RATE.

### 3. Practical Example

Suppose the bond is currently selling at a price of \$1,000 (par). Given the coupon rate is 8.7%, and the bond trades at par, the YTM is:

- $YTM \approx 8.7\%$

However, in real market conditions, the bond's price may fluctuate due to interest rate changes, credit risk, or market sentiment, leading to YTM adjustments.

## **Factors Influencing the Yield and Price of the Bond**

Understanding what causes bond prices and yields to fluctuate is vital for investors aiming to time their investments or hedge risks.

### **1. Market Interest Rates**

- When prevailing market interest rates rise above 8.7%, the bond becomes less attractive, leading to a decrease in its price and an increase in YTM.
- Conversely, if rates fall below 8.7%, the bond's price rises, and YTM decreases.

### **2. Credit Risk and Issuer's Financial Health**

- A deterioration in the issuer's creditworthiness can lead to a risk premium, increasing the bond's yield and decreasing its price.
- Conversely, a stable or improving credit profile can lower yields.

### **3. Inflation Expectations**

- Higher inflation expectations erode real returns, prompting investors to seek higher yields, thus reducing bond prices.
- Lower inflation outlooks tend to support bond prices.

### **4. Liquidity and Market Conditions**

- Bonds with higher liquidity are typically priced higher, with lower yields.
- Market turmoil can lead to wider yield spreads and price volatility.

## **Implications for Investors**

Understanding these dynamics allows investors to make informed decisions:

- **Income Planning:** Bonds with fixed coupons provide predictable income streams, beneficial for retirees or income-focused portfolios.

- Interest Rate Risk: Bond prices inversely correlate with interest rate movements; longer maturities expose investors to more significant price swings.
- YTM as a Benchmark: Comparing a bond's YTM with market rates helps determine whether it is undervalued or overvalued.
- Portfolio Diversification: Bonds can diversify risk, especially when yields are attractive relative to equities or other asset classes.

## Conclusion: The Significance of the 8.7% Coupon Bond

The annual coupon bond paying 8.7% interest with a four-year maturity and a face value of \$1,000 embodies a straightforward yet nuanced financial instrument. Its appeal lies in its predictable income, relative safety, and clarity of cash flows. Yet, understanding its valuation, especially the concept of Yield to Maturity, is essential for assessing its true market value and expected returns.

Market conditions, interest rate trends, and issuer credit risks influence the bond's price and yield. Investors must consider these factors when purchasing or holding such bonds to optimize returns or manage risks effectively. The interplay between coupon rate, market yield, and bond price exemplifies fundamental principles of fixed-income investing, highlighting the importance of analytical rigor in financial decision-making.

In essence, this bond serves as a microcosm of the broader bond market dynamics, offering insights into how fixed-income securities function and how investors can interpret their yields in the context of prevailing economic conditions. Whether held to maturity or traded actively, understanding these concepts ensures investors are better equipped to navigate the evolving landscape of fixed-income investments.

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