

Uppose $RRF=6\%$, $rM=9\%$, And $Bi=1.5$ A.What Is R_i , The Required Rate Of Return On Stock I? Round Your Answer

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Understanding the required rate of return on a stock is a fundamental aspect of investment analysis and portfolio management. Investors and financial analysts use this metric to evaluate whether a stock is worth purchasing based on its expected profitability relative to its risk profile. In this article, we will explore the calculation of the required rate of return on Stock I, given the risk-free rate, the market rate, and the beta coefficient. We will also discuss the concepts behind these figures and how they influence investment decisions.

Fundamental Concepts in Stock Return Calculation

Before delving into the calculation, it's essential to understand some key financial concepts:

Risk-Free Rate (RRF)

The risk-free rate (RRF) represents the return an investor can expect from an absolutely risk-free investment over a specific period. Typically, government treasury bonds are used as a benchmark for the risk-free rate because they are considered free of default risk.

Market Rate of Return (rM)

The market rate of return (rM) reflects the average return expected from the overall stock market. It accounts for the general risk and return environment, often measured using a broad market index such as the S&P 500.

Beta Coefficient (B_i)

Beta measures the sensitivity of a stock's returns relative to the overall market. A beta of 1 indicates that the stock moves in line with the market. A beta greater than 1 suggests higher volatility and risk, while a beta less than 1 indicates lower volatility.

Capital Asset Pricing Model (CAPM)

The most widely used model for estimating the required rate of return on a stock is the Capital Asset Pricing Model (CAPM). The formula is:

$$R_i = R_{RF} + \beta_i (r_M - R_{RF})$$

Where:

- R_i = Required rate of return on stock i
- R_{RF} = Risk-free rate
- β_i = Beta coefficient of stock i
- r_M = Expected market return

This model assumes that investors are rational and markets are efficient, meaning that the expected return on a stock compensates investors for the time value of money and the risk taken.

Calculating the Required Rate of Return (R_i)

Given the data:

- Risk-Free Rate, $R_{RF} = 6\%$
- Market Return, $r_M = 9\%$
- Beta of Stock I, $\beta_i = 1.5$

Applying the CAPM formula:

$$R_i = 6\% + 1.5 \times (9\% - 6\%)$$

Step-by-step calculation:

1. Calculate the market risk premium:

$$r_M - R_{RF} = 9\% - 6\% = 3\%$$

2. Multiply the market risk premium by beta:

$$1.5 \times 3\% = 4.5\%$$

3. Add the risk-free rate:

$$R_i = 6\% + 4.5\% = 10.5\%$$

Therefore, the required rate of return on Stock I is 10.5%.

Interpreting the Result

An expected return of 10.5% indicates the minimum return an investor should anticipate to compensate for the risk associated with Stock I, given its beta and the current market and risk-free rates. This rate is crucial for making informed investment decisions, such as:

- Comparing the required return with the stock's projected or historical returns.
- Determining whether the stock is undervalued or overvalued.
- Setting investment benchmarks and portfolio allocations.

Additional Considerations in Return Estimations

While CAPM provides a straightforward estimate, investors should be aware of other factors that might influence the required rate of return:

Market Volatility

Beta captures market risk but does not account for company-specific risk or macroeconomic factors.

Interest Rate Fluctuations

Changes in the risk-free rate or market returns can significantly impact the required rate of return over time.

Investor Risk Tolerance

Different investors have varying risk appetites; some might accept lower returns for less risk, while others seek higher returns for higher risk.

Conclusion

In conclusion, the required rate of return on Stock I, given a risk-free rate of 6%, a market return of 9%, and a beta of 1.5, is approximately 10.5%. This figure is fundamental for investors making buy or sell decisions, portfolio management, and assessing the attractiveness of a stock relative to its risk profile. Using the CAPM model provides a standardized method to quantify the expected return, integrating key risk factors into investment analysis. Always consider market conditions and individual risk preferences when applying these calculations to real-world scenarios.

Summary of Key Points

- The CAPM formula is essential for estimating the required rate of return on stocks.

- Given data: $RRF = 6\%$, $r_M = 9\%$, $B_i = 1.5$.
- The calculated R_i (required return) for Stock I is 10.5%.
- This rate helps investors evaluate stock attractiveness relative to risk.
- Additional factors, such as market volatility and macroeconomic shifts, can influence the actual returns.

By understanding and applying the principles outlined above, investors can better navigate the complexities of stock valuation and make more informed investment decisions in the dynamic financial markets.

Frequently Asked Questions

Given $RRF = 6\%$, $r_M = 9\%$, and $B_i = 1.5$, what is the required rate of return on stock i (R_i)?

$$R_i = RRF + (r_M - RRF) B_i = 6\% + (9\% - 6\%) 1.5 = 6\% + 4.5\% = 10.5\%$$

How do you calculate the required rate of return on a stock using the Capital Asset Pricing Model (CAPM)?

Using CAPM, $R_i = RRF + (r_M - RRF) B_i$, where RRF is the risk-free rate, r_M is the market return, and B_i is the beta of the stock.

What does the beta (B_i) represent in the context of stock return calculations?

Beta measures a stock's sensitivity to market movements; a beta of 1.5 indicates the stock is 50% more volatile than the market.

If the risk-free rate increases to 7%, with other values unchanged, what is the new R_i ?

$$R_i = 7\% + (9\% - 7\%) 1.5 = 7\% + 3\% = 10\%$$

Why is the market risk premium ($r_M - RRF$) important in calculating stock returns?

It represents the additional return investors expect for taking on market risk, which is multiplied by beta to determine the stock's risk-adjusted return.

What is the significance of rounding the computed R_i in financial calculations?

Rounding provides a clearer, more practical figure for decision-making; in this case, R_i rounds to approximately 10.5%.

If a stock has a beta lower than 1, how does that affect its required rate of return?

A lower beta indicates less volatility relative to the market, resulting in a lower required rate of return.

Can the required rate of return (R_i) be used to assess whether a stock is undervalued or overvalued?

Yes, comparing the calculated R_i with the stock's expected or current return can help assess if the stock is undervalued or overvalued.

What assumptions are made when using the CAPM formula to determine R_i ?

Assumptions include efficient markets, a risk-free rate, a known market return, and a linear relationship between beta and expected returns.

How does an increase in market volatility impact the required rate of return (R_i)?

Increased market volatility raises the market risk premium, leading to a higher R_i for stocks with positive beta values.

Additional Resources

Suppose $RRF=6\%$, $r_M=9\%$, and $B_i=1.5$. What is R_i , the required rate of return on Stock I? Round your answer

Introduction

In the world of finance, understanding the required rate of return (R_i) on a stock is fundamental for investors and analysts alike. It guides investment decisions, helps in valuation, and measures the expected compensation for risk. Given specific data points—such as the risk-free rate (RRF), the expected market return (r_M), and the stock's beta (B_i)—calculating R_i becomes a straightforward application of the Capital Asset Pricing Model (CAPM). In this article, we will explore how to determine R_i with the provided data: $RRF = 6\%$, $r_M = 9\%$, and $B_i = 1.5$. We will delve into the CAPM

framework, interpret each component, and demonstrate the calculation step-by-step. Whether you're a finance student, a professional investor, or an avid reader interested in market dynamics, this comprehensive guide will deepen your understanding of the required rate of return and its significance.

The Importance of the Required Rate of Return

Before diving into calculations, it's essential to understand why R_i matters. The required rate of return represents the minimum return an investor expects to earn from an investment given its risk profile. It acts as a benchmark for evaluating whether a stock is a worthwhile investment. If the expected return exceeds R_i , the stock might be undervalued and potentially attractive; if not, it might be overvalued or too risky.

In practice:

- Investment valuation often involves discounting future cash flows at the R_i .
- Portfolio management relies on R_i to balance risk and return.
- Risk assessment uses beta to gauge how sensitive a stock's returns are relative to market movements.

Given these roles, accurately calculating R_i is crucial for sound investment decision-making.

Understanding the Components: RRF, r_M , and Beta

To calculate R_i , the foundational model used is the Capital Asset Pricing Model (CAPM). The model relates the expected return of an asset to its systematic risk, encapsulated by beta, alongside the risk-free rate and the market return.

Risk-Free Rate ($RRF = 6\%$)

The risk-free rate (RRF) reflects the return on an investment with zero risk, typically government bonds of stable countries. It represents the baseline return an investor would earn without taking any market risk. In our scenario, RRF is 6%, indicating that a riskless investment yields 6% annually.

Expected Market Return ($r_M = 9\%$)

The expected market return (r_M) is the anticipated return from a broad market portfolio, such as a stock market index. It incorporates the overall growth prospects and risks inherent in the economy. Here, r_M is 9%, suggesting the market as a whole is expected to generate a 9% return.

Beta ($B_i = 1.5$)

Beta measures a stock's sensitivity to market movements. A beta of 1 indicates the stock moves in sync with the market. Greater than 1 implies higher volatility—more risk and, potentially, higher return. Conversely, less than 1 indicates lower risk. In our case, B_i is

1.5, meaning the stock is 50% more volatile than the market.

The Capital Asset Pricing Model (CAPM)

CAPM provides a formula to estimate the expected return (R_i):

$$R_i = RRF + \beta_i (r_M - RRF)$$

Where:

- R_i = Required rate of return on stock i
- RRF = Risk-free rate
- β_i = Beta of stock i
- r_M = Expected market return

This model assumes investors are rational, markets are efficient, and investors seek to maximize returns for given risks.

Step-by-Step Calculation of R_i

Given the data:

- RRF = 6%
- r_M = 9%
- β_i = 1.5

Plugging into the CAPM formula:

1. Calculate the market risk premium:

$$r_M - RRF = 9\% - 6\% = 3\%$$

2. Multiply the beta with the market risk premium:

$$1.5 \times 3\% = 4.5\%$$

3. Add the risk-free rate to find R_i :

$$R_i = 6\% + 4.5\% = 10.5\%$$

Answer: The required rate of return on Stock I is 10.5%.

Interpretation of the Result

The calculated R_i of 10.5% indicates that investors require a return of approximately 10.5% to compensate for the stock's systematic risk, given the prevailing risk-free rate and market conditions. Since the stock's beta exceeds 1, it is considered riskier than the

average market portfolio, justifying a higher return expectation.

Investors can use this figure as a benchmark:

- If the stock's expected return exceeds 10.5%, it may be undervalued or present a good investment opportunity.
- If it falls below, the stock might be overvalued or too risky relative to the expected payoff.

Practical Applications of R_i Calculation

Understanding and calculating R_i is vital across various financial contexts:

- Stock Valuation: Discounting future cash flows at R_i to estimate intrinsic value.
- Portfolio Optimization: Combining stocks to maximize returns for a given level of risk.
- Performance Measurement: Comparing actual returns to R_i to assess performance.
- Risk Management: Identifying whether the risk premium justifies the potential reward.

Limitations and Considerations

While CAPM is widely used, it's essential to recognize its limitations:

- Assumption of Market Efficiency: In reality, markets are not perfectly efficient.
- Historical Beta: The beta used is often based on historical data, which may not predict future volatility accurately.
- Single-Factor Model: CAPM considers only systematic risk, ignoring other risk factors like size, value, or liquidity.
- Constant Risk-Free Rate: RRF can fluctuate over time, affecting calculations.

Investors should consider these factors and complement CAPM with other valuation models and qualitative analysis.

Conclusion

Determining the required rate of return (R_i) on a stock is a cornerstone of financial analysis, guiding investment choices and valuation strategies. Using the CAPM formula, with the given parameters—risk-free rate of 6%, market return of 9%, and beta of 1.5—the calculation yields an R_i of approximately 10.5%. This figure encapsulates the compensation investors demand for taking on the stock's systematic risk, aligning expectations with market realities.

In a landscape where risk and reward are intertwined, such calculations serve as vital tools for both seasoned investors and newcomers. By understanding the underlying components and assumptions, market participants can make more informed decisions, balancing potential rewards against inherent risks. As markets evolve, so too must our models, but the core principles of risk measurement and return expectations remain

fundamental to sound investing.

Final Thoughts

Whether you're evaluating a single stock or managing a diversified portfolio, knowing how to accurately compute the required rate of return empowers you to make strategic, data-driven decisions. The CAPM remains a foundational model, offering clarity amidst market complexity. Remember, though, that no model is perfect; always consider broader economic factors and your own risk appetite when interpreting these numbers.

Invest wisely, and let your understanding of risk and return be your guide in the ever-changing financial landscape.

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