

8. Determine The Beta Of A Portfolio Formed By 30% Risk-free Asset, 25% Stocks Of UBS With A Volatility

8. Determine The Beta Of A Portfolio Formed By 30% Risk-free Asset, 25% Stocks Of UBS With A Volatility

8. Determine The Beta Of A Portfolio Formed By 30% Risk-free Asset, 25% Stocks Of UBS With A Volatility is a fundamental concept in investment analysis, combining principles of portfolio diversification, risk measurement, and asset beta calculation. Understanding how to compute the beta of such a mixed portfolio helps investors assess its market sensitivity and overall risk exposure. This article explores the step-by-step process to determine the beta, considering the composition of the portfolio, the characteristics of the risk-free asset, and the beta of UBS stocks.

Understanding Beta and Its Significance in Portfolio Management

What Is Beta?

Beta is a measure of an asset's or portfolio's sensitivity to market movements. It indicates how much the asset's returns are expected to change in response to a 1% change in the overall market's returns. A beta of 1 implies the asset moves in tandem with the market, greater than 1 indicates higher volatility, and less than 1 suggests lower volatility relative to the market.

Why Is Beta Important?

- **Risk Assessment:** It helps quantify the systematic risk associated with an asset or portfolio.
- **Portfolio Diversification:** Combining assets with different betas can optimize risk-return trade-offs.
- **Cost of Capital:** Beta is used to estimate the required return on equity via the Capital Asset Pricing Model (CAPM).

Components of the Portfolio

Risk-Free Asset (30%)

The risk-free asset, often represented by government treasury bills or bonds, has a beta of zero. It provides a stable return with no market risk, acting as the safe component of the portfolio.

Stocks of UBS (25%)

UBS stocks are subject to market risk, and their beta reflects how volatile they are relative to the market. For the purpose of this calculation, we need the beta value of UBS stocks, which can be obtained from financial data sources such as Bloomberg, Reuters, or UBS's own disclosures.

Remaining Portfolio (45%)

The remaining 45% is composed of other assets or cash, but for simplicity, we will focus on the risk-free asset and UBS stocks as the main components.

Calculating the Beta of the Portfolio

Methodology Overview

The beta of a portfolio is the weighted sum of the individual asset betas:

$$\text{Beta}_{\text{Portfolio}} = (w_1 \cdot \text{Beta}_1) + (w_2 \cdot \text{Beta}_2) + \dots + (w_n \cdot \text{Beta}_n)$$

where w_i is the weight of asset i in the portfolio, and Beta_i is its beta.

Since the risk-free asset has a beta of zero, its contribution to the portfolio beta is null, simplifying the calculation.

Step-by-Step Calculation

1. Identify the weights:

- Risk-free asset: 30% (0.30)
- UBS stocks: 25% (0.25)
- Remaining assets: 45% (0.45) — if applicable, but for this example, focus on the two main components.

2. Obtain the beta of UBS stocks:

- Let's assume, for illustration, that the beta of UBS stocks is 1.2 (this value varies depending on the

source and time period).

3. Calculate the portfolio beta:

- Since the risk-free asset's beta is 0, the formula reduces to:

$$\text{BetaPortfolio} = (w_{\text{UBS}} \text{Beta}_{\text{UBS}}) + (w_{\text{Risk-Free}} 0)$$

- Plugging in the numbers:

$$\text{BetaPortfolio} = (0.25 \cdot 1.2) + (0.30 \cdot 0) = 0.30 + 0 = 0.30$$

4. Adjust for other assets if necessary:

- If the remaining 45% has a known beta, include it in the calculation accordingly.

Considering Volatility and Its Relationship to Beta

Volatility vs. Beta

Volatility measures the total risk (standard deviation of returns), while beta measures market-related risk (systematic risk). A high volatility does not necessarily mean a high beta, but assets with high systematic risk tend to have higher beta values.

Role of Volatility in Portfolio Risk Assessment

- Understanding the volatility of UBS stocks helps in estimating potential fluctuations in returns.
- Combining assets with different volatility profiles affects the overall risk of the portfolio.

Practical Example: Calculating the Portfolio Beta

Given Data

- Risk-free asset weight: 30%
- UBS stocks weight: 25%
- Beta of UBS stocks: 1.2
- Remaining assets: 45% (assume beta is 1.0 for illustration)

Calculation Steps

1. Calculate contribution of risk-free asset: $0.30 \cdot 0 = 0$
2. Calculate UBS stocks contribution: $0.25 \cdot 1.2 = 0.30$
3. Calculate remaining assets contribution: $0.45 \cdot 1.0 = 0.45$
4. Sum all contributions: $0 + 0.30 + 0.45 = 0.75$

Result

The beta of this diversified portfolio is approximately **0.75**. This indicates that the portfolio is less volatile than the overall market but still carries systematic risk.

Implications of the Portfolio Beta

Investment Strategies

- Low-beta portfolios are suitable for conservative investors seeking stability.
- Higher beta portfolios are preferred by aggressive investors aiming for higher returns with increased risk.

Risk Management

- Understanding the beta helps in aligning the portfolio's risk with investor's risk tolerance.
- Adjusting asset weights based on their betas can optimize the risk-return profile.

Conclusion

Determining the beta of a portfolio composed of risk-free assets and stocks like UBS involves understanding the individual components' betas and their weights within the portfolio. Given that risk-free assets have a beta of zero, the overall beta primarily depends on the stock holdings' beta and

their proportion. By accurately calculating the beta, investors can better assess their portfolio's market sensitivity and make informed decisions aligned with their risk appetite. Remember, while volatility provides insight into total risk, beta offers a focused view on market-related systematic risk, essential for strategic portfolio management.

Frequently Asked Questions

What is the formula to determine the beta of a portfolio composed of a risk-free asset and stocks?

The beta of a portfolio is calculated as the weighted sum of the individual assets' betas: $\text{Beta}_{\text{portfolio}} = (w_{\text{risk-free}} \text{Beta}_{\text{risk-free}}) + (w_{\text{stocks}} \text{Beta}_{\text{stocks}})$. Since the risk-free asset has a beta of 0, the formula simplifies to $\text{Beta}_{\text{portfolio}} = w_{\text{stocks}} \text{Beta}_{\text{stocks}}$.

How does including a risk-free asset impact the overall beta of the portfolio?

Including a risk-free asset reduces the overall beta of the portfolio because the risk-free asset has a beta of zero, which lowers the weighted average beta depending on the proportion invested in risky assets.

Given a portfolio with 30% risk-free asset and 25% stocks, how do you calculate the beta of the stock component?

You need to know the stock's individual beta, typically provided or estimated based on market data. Once known, the stock's contribution to the portfolio beta is $0.25 \text{Beta}_{\text{stocks}}$, and since the risk-free component has zero beta, the total portfolio beta depends mainly on the stocks' beta.

If the volatility of UBS stocks is known, how is it related to the beta of the stock?

Beta measures systematic risk relative to the market, while volatility measures total risk. To relate volatility to beta, you need the market volatility. The formula is $\text{Beta} = (\text{Correlation between stock and market}) (\text{Stock volatility}) / (\text{Market volatility})$.

How does the volatility of UBS stocks influence the calculation of portfolio beta?

While volatility indicates total risk, beta reflects systematic risk. Higher stock volatility, combined with high correlation to the market, can lead to a higher beta. Conversely, if the stock's volatility is high but uncorrelated with the market, the beta may be lower.

What assumptions are made when calculating the beta of a

portfolio with a risk-free asset and stocks?

The main assumptions include that the risk-free asset has a beta of zero, the stocks' beta remains constant over time, and correlations between assets are stable. Additionally, it assumes linear relationships between returns.

How does the weight of the risk-free asset affect the portfolio's overall beta?

Increasing the proportion of the risk-free asset decreases the overall beta, making the portfolio less sensitive to market movements, whereas decreasing it increases beta and market sensitivity.

Can the beta of a portfolio be greater than 1 with the given asset weights?

Yes, if the stocks in the portfolio have a beta greater than 1 and constitute a significant proportion of the portfolio, the overall beta can exceed 1. In this case, with 25% invested in UBS stocks, the stock's individual beta determines the portfolio's beta.

What is the significance of knowing the beta of a portfolio formed by risk-free assets and stocks?

Knowing the portfolio's beta helps investors understand its sensitivity to market movements, assess systematic risk, and make informed decisions about risk management, asset allocation, and expected returns.

Additional Resources

Determine The Beta Of A Portfolio Formed By 30% Risk-Free Asset, 25% Stocks Of UBS With A Volatility

Understanding the beta of a portfolio is a fundamental aspect of modern financial analysis, particularly for investors seeking to balance risk and return effectively. When constructing a portfolio that combines risk-free assets with equities, such as UBS stocks, calculating the overall beta becomes crucial for assessing the portfolio's sensitivity to market movements. In this article, we delve into the process of determining the beta of a mixed portfolio consisting of 30% risk-free assets and 25% stocks of UBS, taking into account the volatility of UBS shares. This comprehensive discussion aims to equip investors and finance professionals with the insights needed to evaluate and optimize such portfolios.

Introduction to Portfolio Beta and Its Significance

What Is Beta?

Beta is a measure of a security's or a portfolio's sensitivity to overall market movements. It indicates how much the asset's returns tend to change in response to market returns. A beta of 1 suggests that the asset moves in line with the market, while a beta less than 1 indicates less sensitivity, and greater than 1 signifies higher sensitivity.

Importance of Portfolio Beta

- Risk Assessment: Helps quantify systematic risk inherent to the entire market.
- Portfolio Optimization: Guides investors in balancing risk and expected returns.
- Performance Evaluation: Assists in benchmarking performance against market movements.
- Capital Asset Pricing Model (CAPM): Critical for estimating expected returns based on market risk.

Components of the Portfolio

The portfolio under consideration is composed of:

- 30% Risk-Free Asset: Typically government treasury bills or similar instruments, offering zero or negligible beta.
- 25% UBS Stocks: Equity of UBS, a global financial services firm, with a certain volatility and beta.
- Remaining 45%: Presumably other assets or cash, which we will consider as risk-free or with negligible beta unless specified otherwise.

For clarity, the focus is on the 30% risk-free and 25% UBS stocks, as specified.

Determining The Beta of UBS Stocks

Understanding UBS Stock Volatility

Volatility is a statistical measure of the dispersion of returns for a given security, often expressed as standard deviation. While volatility and beta are related—both measure risk—they capture different aspects:

- Volatility: Total risk, including systematic and unsystematic risk.
- Beta: Systematic risk relative to the market.

UBS's beta is usually estimated via regression analysis against a market index (e.g., S&P 500, MSCI World Index). For this analysis, assume we have:

- UBS Beta (β_{UBS}): Known or estimated from historical data.
- UBS Volatility (σ_{UBS}): Standard deviation of UBS returns.

Suppose UBS's beta is estimated at 1.2 based on historical data, indicating UBS stock tends to be 20% more volatile than the market.

Calculating or Estimating UBS Beta

- Using Regression Analysis: Regress UBS returns against market returns to find beta.
- Using Covariance and Variance:

$$\beta_{\text{UBS}} = \frac{\text{Covariance}(\text{UBS}, \text{Market})}{\text{Variance}(\text{Market})}$$

- From Volatility: If the market volatility (σ_{market}) is known, and UBS's volatility (σ_{UBS}) is known, then:

$$\beta_{\text{UBS}} = \frac{\text{Correlation}(\text{UBS}, \text{Market}) \times \sigma_{\text{UBS}}}{\sigma_{\text{Market}}}$$

In practice, the correlation coefficient is needed, but if not available, market beta estimates from financial data sources are used.

Calculating Portfolio Beta

Basic Formula

The beta of a portfolio ($\beta_{\text{portfolio}}$) is the weighted sum of the individual assets' betas:

$$\beta_{\text{portfolio}} = \sum_i w_i \times \beta_i$$

where:

- w_i = weight of asset i in the portfolio
- β_i = beta of asset i

In our case, with two components:

$$\beta_{\text{portfolio}} = w_{\text{Risk-Free}} \times \beta_{\text{Risk-Free}} + w_{\text{UBS}} \times \beta_{\text{UBS}}$$

Since the risk-free asset has a beta of zero:

$$\beta_{\text{Risk-Free}} = 0$$

Therefore:

$$\beta_{\text{portfolio}} = (0.3 \times 0) + (0.25 \times \beta_{\text{UBS}}) + \text{(other assets' contribution if any)}$$

Assuming the remaining 45% is either risk-free or with negligible beta, the total beta simplifies to:

$$\beta_{\text{portfolio}} = 0.25 \times \beta_{\text{UBS}}$$

If UBS's beta is 1.2, then:

$$\beta_{\text{portfolio}} = 0.25 \times 1.2 = 0.3$$

This indicates the portfolio's sensitivity to market movements is 0.3, meaning it moves approximately 30% in response to market changes.

Incorporating Volatility Into Beta Calculation

While beta primarily measures systematic risk relative to the market, volatility reflects total risk. To refine our understanding, we can explore the relationship between UBS's volatility and beta.

- Assuming correlation (ρ): The degree to which UBS stocks move with the market.
- Using the formula:

$$\beta_{\text{UBS}} = \rho_{\text{UBS, Market}} \times \frac{\sigma_{\text{UBS}}}{\sigma_{\text{Market}}}$$

If the correlation is high (e.g., 0.9) and market volatility (σ_{market}) is 15%, UBS's volatility (σ_{UBS}) is 20%, then:

$$\beta_{\text{UBS}} = 0.9 \times \frac{20\%}{15\%} = 0.9 \times 1.33 = 1.2$$

which confirms our earlier estimate.

Note: Precise beta calculation requires actual data, but this approach provides a solid approximation.

Impacts of Portfolio Composition on Beta

Risk-Free Asset Impact

Including a risk-free asset reduces the overall portfolio risk and beta proportionally:

- Advantages:
 - Lower systematic risk.
 - More stable returns.
- Disadvantages:
 - Lower expected return potential.
 - Reduced exposure to market upside.

Stock Allocation Influence

The proportion of stocks like UBS directly influences the portfolio's beta:

- Increasing UBS allocation raises beta, increasing market sensitivity.
- Decreasing UBS allocation lowers beta, reducing market risk exposure.

Practical Considerations and Limitations

- Beta Stability: Beta estimates can vary over time; regular recalibration is necessary.
- Assumption of Linearity: The linear relationship may not hold during extreme market conditions.
- Correlation Variations: Changes in correlation between UBS and the market impact beta.
- Volatility vs. Systematic Risk: High volatility does not necessarily mean high beta; the stock could be volatile due to unsystematic factors.

Conclusion and Final Insights

Determining the beta of a portfolio comprising 30% risk-free assets and 25% UBS stocks involves understanding the individual betas and their weights within the portfolio. Using the weighted sum approach, and assuming UBS's beta is approximately 1.2, the overall portfolio beta is around 0.3. This indicates moderate market sensitivity, suitable for investors seeking a balance between risk and return.

The key takeaways include:

- The risk-free asset contributes zero to the portfolio's beta, providing stability.
- UBS stocks' beta significantly influences the portfolio's overall market risk.
- Accurate beta estimation hinges on reliable data regarding UBS's historical returns, correlation with the market, and volatility.

- Adjusting asset weights allows investors to tailor their risk exposure to match investment objectives.

In summary, calculating the beta of such a mixed portfolio is a vital step in strategic asset allocation. It helps quantify systematic risk and guides investors in making informed decisions aligned with their risk tolerance and return expectations. Regular updates and understanding the underlying assumptions will ensure the portfolio remains aligned with market dynamics and personal investment goals.

8 Determine The Beta Of A Portfolio Formed By 30 Risk Free Asset 25 Stocks Of Ubs With A Volatility

8 Determine The Beta Of A Portfolio Formed By 30 Risk Free Asset 25 Stocks Of Ubs With A Volatility

Related Articles

- [A Bowl Contains 675 Sweets Which Are Coloured Either Red, Blue Or Green.The Ratio Of Red Sweets To Blue](#)
- [2- The Figure Below Shows The State Transition Diagram For The Markov Chain. In This Diagram, There Are](#)
- [When A Carbon Atom Forms Covalent Bonds To 4 Different Atoms, Those Bonds Angle Towards The Corners Of](#)

[Back to Home](#)