

The Theory of Asset Pricing

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Abstract: This assignment explores the theory of asset pricing and mainly focuses on the capital asset pricing model (CAPM). Also, the assignment addresses the CAPM as a model that explains how the projected return on an asset is equivalent to the risk-free rate of return plus a risk premium that is proportionate to the asset's beta. The assignment further evaluates the advantages of the model and explains comprehensively some of the drawbacks that make the model criticized by most researchers. Therefore, criticizing the model led to the rise of other efficient asset pricing models. Hence one of the popular alternative models of the CAPM is the Fama-French model, which accounts for value and size risks to the market risk factor. Lastly, the assignment has analyzed the traditional and non-traditional factors that affect the CAPM.

Keywords: CAPM, Fama-French model.

1. Introduction

Pricing assets can be very challenging especially due to the several uncertainties that affect the market. However, there are various approaches such as asset pricing theory that assist the investors. Assagaf [1] identifies asset pricing as the study of how financial assets are priced in the marketplace. It involves examining the relationships between the various assets and liabilities in an economy, and the determination of the prices of those assets and liabilities. Asset pricing is used by investors and financial analysts to assess the projected return on an investment as well as the risks connected with that investment. Although it can be challenging since the risk of uncertain payments and timing have to be accounted for instantaneously. A high rate of return indicates a low price; therefore, asset pricing can be used to explain why some assets have a higher rate of return than others. Hence there are a number of different theories that attempt to explain how assets are priced. The most popular theories are the efficient market hypothesis, the capital asset pricing model, and the Black-Scholes model. Cooper and Maio [2] explains that the efficient market hypothesis explains how the market price of an asset replicates all available assets information about that asset. On the other hand, the CAPM reveals how the estimated return on an asset is a function of the risk of that asset. While the Black-Scholes model is a mathematical model used to price options. However, the market hypothesis and the CAPM both state that the market price of an asset replicates all available information about that asset. While the Black-Scholes model is used to price options, and it takes into account the risk of the asset. This assignment will evaluate the CAPM.

2. The Capital Asset Pricing Model (CAPM)

According to Dawson [3], the CAPM is a model that explains how the anticipated return on an investment portfolio is equivalent to the risk-free rate of return and a risk premium that is proportional to the asset's beta. The beta of an asset measures the risk of that asset in relation to the market as a whole. It is a model that attempts to identify and measure the risk premium associated with investing in any given asset. Elbannan [4] argue that the model is established on the approach that investors require high return on investment when they are taking on more risk. To calculate the estimated return on a given asset, the model takes into account the risk-free rate of return as well as the beta of the asset in question. Its formula shows below. In the formula, R_a represents the expected rate of return an investor anticipates gaining back after investing their assets, security, or capital. β represents the beta. A risk of an investment is measured using the beta relative to the overall market risk. The R_{rf} symbols represent the Risk-free rate. This implies that the risk-free rate of return is the rate of return offered on investments that are considered to be free of risk, such as government bonds. Lastly, the R_m represents the expected return of the market. Therefore, a market risk premium is derived from subtracting the risk-free rate from the projected return of the market.

The CAPM is a very popular model for estimating the expected return on investment. However, it is significant to identify that the model is not perfect and should not be used in isolation. In fact, there is a large body of research that suggests that the CAPM may not always be accurate in predicting returns. Despite its limitations, the CAPM is still a widely used and studied model in finance. It provides a simple way to estimate expected returns and can be used to help investors make informed decisions about where to allocate their capital [3]. Some recent research has questioned the validity of the CAPM, particularly in its ability to accurately predict returns in today's markets.

3. Advantages of CAPM and its Application

Compared to other theories of asset pricing, CAPM does a good job of studying asset pricing. This is because it shows how the financial markets price the securities and further analyzes the expected returns on capital investments. Dawson [3] expounds that the theory offers an approach for quantifying risks and converting the risks into estimations of expected returns on their equity. Elbannan [4] further argues that the objective nature of the anticipated costs of equity that the theory gain is the main advantage of CAPM. Since it streamlines the world of financial markets, CAPM cannot be isolated. Hence it supplements other asset pricing techniques that try to establish useful cost and realistic equity computations. It is one of the most widely accepted models in financial economics. It has been extensively tested and found to be empirically valid. Additionally, it is a very simple model that can be applied easily to real-world situations. This makes it a useful tool for investors and analysts [3]. The model relies on two main assumptions that are one security markets are very efficient and competitive this means that companies' information is universally and quickly distributed. The second assumption is that financial markets are controlled by logical investors who are risk-averse and who further seek to maximize satisfaction from returns on their investments.

4. Limitations of CAPM

CAPM is a model that has been widely used and it faces sharp criticism due to several weaknesses it possesses. The main question is if CAPM has the ability to achieve its high-designed objective, which is to expound on the risk-return relationship of assets. Elbannan [4] stipulate that most tests conducted on CAPM have problems explaining the past making it difficult for it to forecast the future. In addition to this, the research from the tests recognized a few symmetries in the divergences [5]. Therefore, the empirical challenges might be the outcome of the theoretical failings. Elbannan [4] further explain these failings are mainly caused by assumptions.

Unrealistic assumptions are one of the limitations of CAPM. Stănculescu [5] explains that assumptions lack the reality aspect. One of the assumptions in this model is the single period horizon. This implies that investors are more alarmed by the wealth generated by the portfolios after the investment's duration is over. In the real world, investors aim to secure lifetime investments to raise their expected returns. Therefore, making ideal investment decisions that consider the returns of future periods can only be achieved by making several assumptions regarding the returns. Secondly, the model uses future data that has not yet been achieved such as expected beta or expected rate of return. Since this cannot be projected with precision hence rely on historical data to estimate future data. Thirdly, the model does not comply with reality for instance assumptions about the lack of instant and free available information. Also, it excludes transaction costs and taxes. According to Assagaf [1], risk-free assets do not actually exist in the real world. It is impractical for all stakeholders or investors to act logically as well as have standardized anticipations based on the estimated returns and standard deviation.

Models in other disciplines capture real relationships that are good estimates of the reality. For instance, economic models sufficiently provide quantitative data while engineering models successfully capture the correlations in the physical world. However, there exist challenges involved with the testing of CAPM. The first problem is that of ex ante data. This simply means that the greatest challenge with the model is that data is based on expected future data. Stănculescu [5] argue that although it relies on historical data, the anticipated returns do not simply mean that the realized returns of the past will be equal to the expected returns. On the other hand, Sattar [6] holds that CAPM cannot be tested and hence cannot be proven if it is true or wrong. Sattar [6] further argues that the greatest challenge with the model is that it is based on the portfolio of the market. Besides stocks, the market portfolio includes uncertain assets, such as real estate and human capital. This makes it challenging to hold the market portfolio thus, a portion of the portfolio has to be established. Lastly, Stănculescu [5] argues that no relationship exists between the betas and the average stock return.

5. CAPM Alternatives

The Fama-French model is one of the CAPM alternatives. Wu et al. [7] explain that factoring in the value and size risks to the market risk factor is the greatest aspect of this model that makes it more efficient than CAPM. Secondly, the anticipated returns are largely based on market factors. This simply means that investment return predictions can be based on the overall market value, market size, and market risks. Unlike the CAPM an approach that applies a single factor of market risk to assess the possible investment returns, the Fama-French model uses three factors which are the amount at which small firms surpass large firms, the overall market, and the amount at which high-value firms surpass low-value firms. In addition to this, Cooper and Maio [2] expound that it uses market capitalization to compute the company size and the price-to-market ratio to compute the firm's value. Lastly, the model is used to differentiate value stocks from growth stocks. Wu et al. [7] argue that growth stocks, the lower book-to-market values are those firms that are considered to have the capacity to surpass the entire market with time due to their future potential but are outperformed by the value stocks. On the other hand, value stocks are categorized as those firms trading below their worth but offer a greater output, also known as high book-to-market ratios. This simply means value investors seek out stocks that are undervalued in the market. Therefore, to differentiate which stock is more efficient for an investor to invest they require the Fama-French model and use the value premium also known and the High minus Low (HML) an aspect of the model to evaluate the stock returns.

6. CAPM is Related to other Factors

6.1. Traditional Factors

Some of the factors related to CAPM include stock prices, such as company earnings, dividends, and the overall economy. As aforementioned above the CAPM evaluates the correlation between the risk and anticipated return of capitalizing on security. Cooper and Maio [2] illustrate that the anticipated output of a portfolio is equivalent to the risk-free return and a risk premium and is further established on the beta of that portfolio.

There are a number of traditional factors that are believed to relate to the CAPM. The most important of these is the investment risk. Cooper and Maio [2] highlight that the greater the investment risk, the anticipated rate of return is high. Secondly, it is the investor's required rate of return. This means that the investors require a rate of return in order to be indifferent between capitalizing on the asset and investing in a risk-free asset such as government bonds. The third factor it is the expected return on the asset over the investment horizon. In addition to this, the size of the company is another factor that relates to CAPM as identified by Arouri et al [8]. The larger the firm, the lesser the required rate of return. According to Hwang et al [9] a bond's maturity is another factor that relates to CAPM. The longer the bond maturity, the higher the required rate of return. Finally, the credit rating of the bond is another factor relating to CAPM. Hence this means that if a bond has a higher credit rating the required rate of return is expected to be lower.

Additionally, the expected rate of return also depends on the specific investment. For example, the required rate of return between stocks and bonds is totally different. Also, the expected rate of return depends on the investor's age, investment goals, and risk tolerance. In general, investors need a higher rate of return for uncertain investments. For instance, an investor may want a higher rate of return for investing in a stock that is not as stable as a bond. Therefore, Hwang et al [9] argue that investors with a higher risk tolerance may be willing to accept a higher required rate of return in order to receive a greater investment rate of return. This illustrates that the rate of return is also affected by investment risk. For example, an investor may require a higher rate of return for investing in a stock that is not as stable as a bond. While on the other hand, investors who are looking to invest in less risky security may want to invest in a bond rather than a stock. Arouri et al [8] explain a bond is a debt security that is issued by a government or company. When a bond is purchased, money is loaned to the firm or government in exchange for a set interest rate that is paid to you periodically. Bonds are considered to be less risky than stocks because the holder of a bond is guaranteed to receive the interest payments that are owed to them, and the principal of the bond is typically paid back when the bond matures.

6.2. Non-Traditional Factors

Non-traditional factors affecting CAPM such as search volume, posts, and tweets about a company can help investors gauge the sentiment of the market regarding that company. For example, if there is a high level of search volume for a company, it could be an indication that investors are interested in that company and its stock price may be affected by this sentiment [10]. In addition, Elbannan [4] highlight that if there is a lot of chatter on social media about a company (posts and tweets), it could suggest that investors are optimistic or pessimistic about the company, which could also impact the stock price. Therefore, while the CAPM is a useful tool, it is important to consider these non-traditional factors when making investment decisions. Some investors argue that the CAPM is flawed because it does not take into account company-specific factors, such as its history, management, and products. Additionally, beta is not always a good indicator of risk, as it does not take into account the variability of a security's returns [11]. For example, a security with a high beta may experience large swings in its price, but may not be riskier than security with a low beta. Lastly, beta is calculated

using historical data and does not always reflect how security will perform in the future. A high beta may indicate that a security is more volatile and therefore riskier, while a low beta may indicate that a security is less volatile and therefore less risky. However, beta is not always reflective of a security's future performance.

7. Conclusion

The above literature provides a comprehensive analysis of the CAPM. It is a model that explains how the estimated return on an asset is equivalent to the risk-free rate of return plus a risk premium that is proportionate to the asset's beta. Compared to other theories of asset pricing, CAPM does a good job of studying asset pricing. This is because it shows how the financial markets price the securities and further analyzes the anticipated returns on capital investments. It is one of the most widely accepted models in financial economics. It has been extensively tested and found to be empirically valid. Additionally, it is a very simple model that can be applied easily to real-world situations. This makes it a useful tool for investors and analysts. Despite its advantages, the model has been criticized due to its shortcomings such as the use of unrealistic assumptions like the single period horizon, the use of ex-ante data that relies on future data, some research shows that CAPM cannot be tested and hence cannot be proven if it is true or wrong and more, so it is based on the portfolio of the market. Besides stocks, the market portfolio includes uncertain assets, such as real estate and human capital. This makes it challenging to hold the market portfolio hence, a portion of the portfolio has to be identified. Lastly, research shows that there no relationship exists between the betas and the average stock return. Therefore, with several drawbacks, the model has more efficient alternatives that are used in asset pricing such as the Fama-French model which factors in the value and size risks to the market risk factor.

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