Analysis of Capital Asset Pricing Model: Advantages, Disadvantages and Alternative Models

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Abstract: Return on investment and investment risk have long been worries for investors in financial area. The Capital Asset Pricing Model (CAPM) is the main subject of this investigation. Given the background that the CAPM has limitations but is still important for investors, this paper examines the benefits and weaknesses of the model as well as the four alternatives: the Consumer Capital Asset Pricing Model (CCAPM), the Fama-French Five Factor Model (FFFM), the Fama-French Three Factor Model (FFM), and Arbitrage Pricing Theory (APT). The inference made is that, given to certain assumptions, investors can apply this pricing model to make some judgments more quickly. Investors utilizing the CAPM model can consult the findings of the other four alternative models, all of which have advantages beyond those of the CAPM. The target of the study is to examine and evaluate the ways in which each pricing model can assist investors in reaching the best possible decisions.

Keywords: Capital Asset Pricing Model, APT, FFM, FFFM, CCAPM.

1. Introduction

The CAPM has revolutionized modern finance. William Sharpe, Jack Treynor, John Lintner, and Jan Mossin developed the model in the early 1960s, and it offered the first logical foundation for connecting investment risk to the necessary return [1]. The three components of the CAPM formula are the market rate of return (Rm), the risk-free rate (Rrf), and the investment beta (β a). Below is an illustration of the CAPM formula.

$$Ra = Rrf + [\beta a \times (Rm - Rrf)]$$
(1)

The interest rate that an investor can obtain from securities with little to no risk is mathematically represented as Rrf, or the opportunity cost of taking on extra investment risk. Ra is the expected rate of return on investment, which an investor should have to balance the risk of the venture. To compare a stock's systematic risk to the overall volatility of the market, one can utilize the β a figure. Lower returns and reduced portfolio risk are associated with stocks having a beta value of less than 1, which also makes them more stable than the market overall. Conversely, while better returns are associated with stocks having a beta value greater than 1, these stocks are also more susceptible to overall market volatility. (Rm - Rrf) indicates the extra return that may be expected from the market as a whole over

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the risk-free rate. Its components are the Rrf and the Rm. where Rm is the market's expected rate of return or the estimated rate of return for a widely diversified portfolio [2].

Even if CAPM is crucial to financial practice, there are certain noticeable disadvantages that have arisen with the growth of the financial markets. The topic of CAPM is covered in length in this work; in particular, the benefits, drawbacks, and potential substitute models of CAPM are thoroughly examined, which is essential for further investigation.

2. Advantages

Based on a linear model that explains the link between investment risk and return, the CAPM was developed. To help investors in making decisions, the model offers a means of quantifying risk by converting it into an estimated return on equity. This model is widely used in the market since it is simple to use and has a low barrier to entry. The primary benefit of the linear model refers to it allows decision makers to be appropriately directed by formulas and charts when it comes to complex investment scenarios and returns.

Risk is an inevitable part of investing, and by quantifying the relationship between risk and return, the CAPM indicates the expected return on investment that investors should realize when they take on more risk. There are two sorts of risk: unsystematic risk and systematic (market) risk. Because most investors have diverse portfolios, the CAPM model accounts for systemic risk. where it is believed that all unsystematic danger has been removed. Investors and portfolio managers can discover, and value assets based on their predicted performance in comparison to the market as a whole by focusing on systematic risk.

The CAPM calculates an asset's volatility in relation to the market and uses beta to evaluate risk in response to various investment risk profiles. An asset is seen as riskier and more volatile than the market if its beta value is bigger than 1. An asset is considered less hazardous and volatile if its value of beta is smaller than 1. Investors who are worried about the overall risk of the market can make decisions with the assistance of the CAPM model, which adjusts an asset's anticipated return based on its sensitivity to market volatility (beta). The model gives a precise risk evaluation with beta's assistance [3].

3. Limitations

The main drawback of the CAPM model, despite its usefulness in supporting several investment choices, is that it relies on a set of broad assumptions that are challenging to meet in actual financial markets. Some of the fundamental presumptions include the following: all investors are rational and, in theory, risk-averse; risk and return are linearly related; there is no maximum amount of money that can be borrowed at a risk-free rate of return; there are no taxes, inflation, or transaction costs in the state where the investment environment is located; and all investors have the same amount of time to evaluate information.

The use and validity of the CAPM may be affected by the fact that these assumptions are routinely violated in real markets. Diverse investor tastes, views, and information can result in oddities and inefficiencies in the market. The cost of capital and investment choices may be impacted by taxes, transaction fees, and other frictions. Market portfolios and risk-free rates could not be observable or repeatable, and they might change over time and between nations. Variations in the business climate, the market, or the company's strategy can all affect an asset's beta. Other than beta, an asset's projected return may be influenced by size, value, momentum, or liquidity [4].

As the sole risk measurement parameter in the CAPM model, beta ignores unsystematic or assetspecific risk in favor of just considering systematic risk, or risk related to overall market movements, and making the assumption that investors are properly diversified. The risk profile of individual companies or small portfolios may not be fully captured by this, even though it may be important to large, diversified portfolios. Furthermore, the beta coefficient is predicated on historical data, which means that it considers the previous performance of an asset to be a reliable indicator of its volatility in relation to the market going forward. Because external factors, corporate fundamentals, and market conditions might change and render previous beta estimations less relevant or even wrong, this assumption may not always hold true.

4. Alternative

4.1. APT (Arbitrage Pricing Theory)

ART model is a predictor of asset returns that finds a linear link between an asset's expected return and the macroeconomic variables impacting its risk. It is applicable to the fair market value of momentarily mispriced securities. It assumes that asset prices may occasionally be mispriced for a while and that market behavior is not always efficient. But eventually, the issue ought to be resolved by market forces, bringing the price back to its reasonable market value. Momentary mispricing of securities is viewed by arbitrageurs as a risk-free opportunity to profit.

Assets are priced using both the ART and CAPM models, however at any one time, one model is more applicable and useful than the other. There are numerous elements that can influence the model choice. The degree of danger is the first consideration. It is the primary factor that affects asset pricing. Unlike the APT model, which has a linear function of several unknown risk factors, the CAPM model's predicted return on an asset is a function of market risk. Because the APT model is more accurate and useful in this situation. The length of asset pricing is the second point. Since he only needs to consider one element, CAPM is more advantageous in this situation. It will take more time for APT to identify and measure the factors. In actuality, the only factor taken into account by the CAPM is the market risk premium. This is because the market is always changing, making it easier to compute and more useful. Because the APT takes into account the dynamic nature of the relationship between the market and the variables themselves, it may not be possible to calculate the beta, and the risk associated with each factor's correctness in the time required [5].

Although the APT and CAPM formulations are the same, the CAPM has a factor and a beta. In contrast, the APT approach mandates that every element of an asset, including non-corporate elements, have a corresponding beta. Users of the APT model must perform their own analysis to determine the relevant aspects that may have an impact on the asset's return, though, as APT does not fully assess these qualities.

4.2. Fama-French Three-Factor Model (FFM)

The FFM does this by adding two more components to the market risk factor: book-to-market ratio (also known as the "high book-to-market ratio effect") and company size (sometimes known as the "small market capitalization effect"). To improve the explanatory power of the CAPM, two more variables were added to the model: the size factor (SMB) and the value factor (HML) [6].

Empirical evidence supports the applicability of the FFM to explain the asset return cross-section. The analysis finds that when size and value factors are taken into account, the model's explanatory power outperforms the CAPM. According to the "size effect," startups typically do better over the long term than established companies. The size factor takes this into account. The value factor is responsible for the "value effect," which asserts that value stocks—lower-than-book corporations—generally outperform growth stocks, higher-than-book companies. The model applies the CAPM paradigm to asset returns by considering size and value characteristics as sources of risk. The FFM model works better than the CAPM in many markets, according to the data [7].

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4.3. Fama-French Five-Factor Model

From the Fama French three-factor model, the Fama French five-factor model is enhanced. It expands upon the discounted dividend concept, which holds that a stock's current value is contingent upon its potential dividend payments. The model has five factors: Market Risk Premium, Small Minus Big, High Minus Low, Robust Minus Weak, and Conservative Minus Aggressive.

The market's excess return is known as the MRP. It is the yield on a market portfolio that is heavily weighted toward values. It displays both the additional return that investors must receive from the market and the systemic risk of the entire market. It is the market's excess return. This is the market portfolio's value-weighted return. This "small cap effect" is captured by the SMB factor which shows the disparity in returns between small and large company organizations. The difference in returns between a diversified portfolio of stocks with high and low book-to-market ratios is known as the HML. The RMW compares the returns of stocks that are exceptionally profitable. It is a metric used to compare the returns of very successful and less profitable businesses. The RMW factor is designed to take into consideration the fact that bigger returns are typically associated with more lucrative firms. The difference in returns between investments made aggressively and those made prudently is measured by the CMA factor. It reflects the phenomena that cautiously invested organizations generally outperform aggressively invested ones [8]. As opposed to the three-factor model, Fama and French extended the dividend discount model by adding two additional components: investment and profitability, to more precisely depict the link between risk and return. Instead of employing the threefactor model, Fama and French expanded the dividend discount model by include two additional elements: profitability and investment, which allowed them to more accurately illustrate the relationship between risk and reward. The model helps investors comprehend the process of stock price development and offers richer sources of risk and return [9].

4.4. Consumer Capital Asset Pricing Model (CCAPM)

The CCAPM is an extension of the CAPM, uses consumer β rather than market β to explain the expected return premium on the risk-free rate. The model presupposes that investors base their investment decisions on uncertainties regarding their future consumption.

A basic explanation of the connection between investor risk aversion and wealth and consumption is offered by the CCAPM. The estimated premium that an investor would need to pay to buy a specific stock and how that return is impacted by the consumption-driven risk of stock price volatility are both disclosed by the CCAPM asset valuation model. The return premium generated is proportionate to the consumption beta of a stock or portfolio, which is based on the volatility of that particular stock or portfolio. By adding two new components to the dividend discount model—profitability and investment—Fama and French were able to better capture the relationship between risk and return. The change in stock market returns in relation to growth in consumption is estimated with the use of the CCAPM. A larger projected return on hazardous assets is implied by a higher consumption beta. Rather than using the three-factor model, Fama and French expanded the dividend discount model by incorporating two more elements: profitability and investment, which better represented the relationship between risk and return. Because asset price volatility directly affects consumer utility, or happiness from consumption, assets whose returns are highly correlated with growth in consumption are deemed hazardous. As a result, investors will seek larger returns as compensate for the risks associated with consumer volatility [10].

5. Conclusion

For a considerable time, investors have been concerned about investing risk and returns. The CAPM is the main topic of this research. The article analyzes the benefits and drawbacks of the CAPM,

which is still significant for investors despite its limitations. Besides, alternative models are comprehensively explored, the models examined are the CCAPM, FFFM, FFM, and APT. The implication is that investors can use such pricing models to make some decisions more quickly, provided certain conditions are met. The results of four different alternative models are available to investors utilizing the CAPM model; all of them have benefits over the CAPM model.

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