

The Differences Between Systematic and Non-Systematic Risk and Alternative Approaches to Understanding Risk

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Abstract. This paper first states the differences between systematic and non-systematic risks from several aspects and secondly emphasizes the importance of risk recognition. Then an alternative approach used to understand risks, the Capital Asset Pricing Model (CAPM), is explained, for further measurement and understanding of Systematic and non-systematic risks, while there are still some limitations. Finally, some strategies that can be used in a real-time dynamic stock market are recommended, mainly focusing on the application of beta values.

Keywords: systematic risk; non-systematic risk.

1. Introduction

Systematic and non-systematic risks are important parts of risk management and are significant measures that investors will take into account in investment decisions in the stock market. In the process of understanding risks and balancing portfolios according to expected returns and risk preferences, distinguishing the differences between systematic and non-systematic risks can be vital. Also, some approaches can be used to help the understanding and measure of risks. CAPM is a typical example, where the calculation can provide some information that is helpful in the measurement of risks and developing an understanding of the general selection and valuation of the assets in the investment portfolio.

2. Recognition of different types of risks

Systematic risk, known as market risk, refers to the risk involved in factors affecting the overall investment in a number of industries in the financial market.[1]

Whether a risk is considered systematic or non-systematic mainly depends on whether it can be reduced by diversification.

Generally, systematic risks are caused by uncontrollable and unavoidable factors, including uncertainty in politics, economics, natural disasters, and other sudden events, and affect various industries in the whole financial system and economy

Additionally, systematic risks can be classified as inflationary risk, interest risk, exchange rate risk, macroeconomic risk, social and political risk, and price risk, which cannot be solved by diversification and will influence all types of investors in the financial market, including individuals and financial institutions.

By contrast, the non-systematic risks can be predicted and avoided if the investment is fully diversified based on reliable research. Hence, this type of risk is generally seen as divisible. Different from systematic risks, the causes of non-systematic risks are referring to financial risk, running risk, liquidity risk, and operational risk. So, the investors can measure the risks of investment according to the expressed information of the asset which are in the investment portfolios.

In this case, diversification is a widely used method to hedge the non-systematic risks of investment. As the losses caused by specific risks to a certain stock can be covered by those that get higher returns. Also, the investors may construct the investment portfolio with proper weights by calculation, aiming to get the highest returns possible.

Meanwhile, investors may use a selection of stocks in the portfolio to make the diversification more effective and reduce risk levels further, which is also a significant step in the process of

investment. It might be less risky for investors to choose several stocks with low covariance, as low covariance means the correlation between stocks tends to be lower, reducing the possibility that the price changes of stocks influence each other together in a portfolio, reducing the non-systematic risks specific to the stocks, such as credit risk.

3. The importance of understanding the differences between systematic and non-systematic risks

The investors need to determine whether the risks they are suffering or going to suffer are systematic. One reason is that the nature of the risks can help them to make decisions in the next stages, as the strategies and actions taken by investors should be different when they have different risk preferences for investment. Also, the selection of strategies used should be related to the types of risks they seek to address.

Contrasting to systematic risks, all types of non-systematic risks can be reduced to theoretically zero if the investors diversify their investment portfolios and combine them into the optimum equilibrium M according to their risk preferences. However, this tends to be difficult to achieve in the real stock market, as stocks are mutually correlated with each other, though some are linked with low covariance. So, the price changes may influence each other, and the risks cannot be sequestered.

Taking the example of running risks, investors can invest in a variety of firms and combine the investment in their portfolios. Even though some of these invested firms do not perform well in the capital market, the losses can be covered by the profits from other stocks. Hence, the non-systematic risks are hedged by diversification.

4. Capital Asset Pricing Model (CAPM)

4.1. Beta Values and Expected return

Developed by William Sharpe & John Lintner & Jack Treynor Jan Mossin from asset portfolio theory and capital market theory, it is defined as

$$E(r_i) = r_f + \beta_{im}(E(r_m) - r_f), [2] \quad (1)$$

Where the equilibrium condition is satisfied, and $E(r_i)$ is the expected return of asset I; r_f refers to the risk-free interest rate; β_{im} represents the beta value, which represents the systematic risk of asset I; $E(r_m)$ is the expected market return; and $[E(r_m) - r_f]$ is the market risk premium, which is meant by the difference between the expected market return and the risk-free interest rate.

To get the $E(r_i)$, investors who use CAPM should first calculate β_{im} , the ratio between covariance among the stocks in the investment portfolio and variance of the stock, reflecting systematic risk level. Second, the investors need to take a value as the risk-free interest rate, r_f . The value assumed should be the interest rate of lowly risky and stable assets, especially fixed-income securities, such as the US 10-year treasury bond.

In financial investment, CAPM is widely used to measure the differences in the risks of investing certain assets by beta values. Using this model, the expected risks for the assets can be predicted (Ravi Jagannathan & Ellen R. McGrattan, 1995) [3].

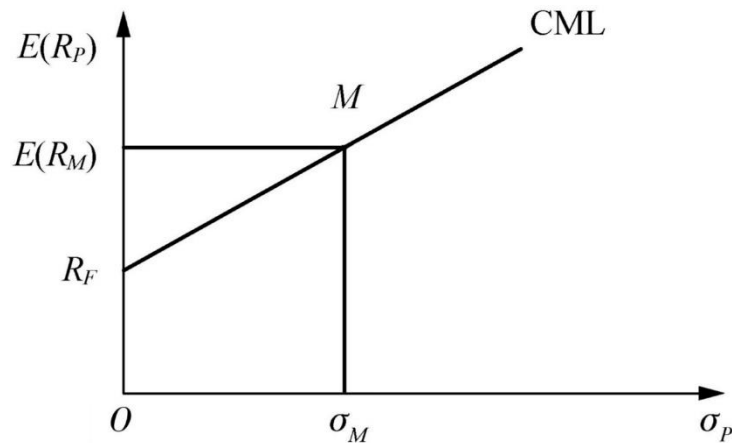


Fig. 1 Capital market line derived from CAPM (Zhu Shuzhen, 2007) [4]

Assuming risks are not preferable, investors tend not to be tolerant of risks unless the premium can cover the costs of risks by providing higher returns in the future. So, the expected return of market stock portfolio M is always positively related to the unique risk level, which is represented by standard deviation, σ_M , as it represents the variations in the prices of certain assets.

Furthermore, the beta value is written as

$$\beta_i = \frac{\text{Cov}(R_i, R_M)}{\text{Var}(R_M)} \quad (2)$$

Contrasting to σ_M , β_i measures systematic risks, rather than non-systematic risks. So, the total market risk level can be stated as

$$\beta_i^2 \sigma_M^2 \quad (3)$$

Which gives an indicator of risk measurement of the investment portfolio.

4.2. An Approach to understanding risks

Overall, investors can calculate the beta value of their portfolio, aiming to achieve the optimum point M which is at the equilibrium. If the beta value exceeds 1, it means systematic risks exist, but the investors can get a higher return if there is a general rise in the average price of the stocks in the capital market. So, the stock with a beta value greater than 1 can be seen as a value attacker, while the stock with a beta value lower than 1 can be seen as a returning defender because the loss of investment will be lower when it goes to a bearish market. By calculating an appropriate expected return, the investors can use the beta values to measure whether the portfolio is within a range that fits their risk preferences. In this case, the CAPM may work properly.

Another more widely used application of CAPM is to check whether or not the investment portfolio is efficient. As shown in figure 2 below, if the portfolio can be drawn in the area below both the curve of the investment portfolio and the capital market line, the investment is efficient, while the tangency point of the capital market line and the curve of the investment portfolio, a line drawn in blue. The reason is that the capital market line shows the portfolio that is most ideal in the stock market, but it might be impossible to achieve in the real stock market, due to the correlation between different stocks. Hence, investors can only make efforts on enabling the portfolio to be close to the Capital Market Line, in the region shaded bright yellow.

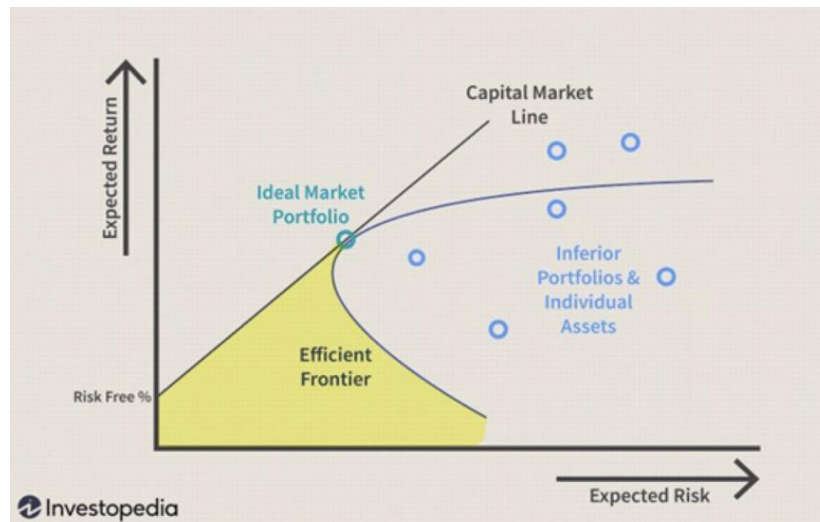


Fig. 2 Efficient and inefficient regions in CAPM (Will Kenton,2022) [5]

4.3. Limitation: Unrealistic Assumptions

Even though Capital Asset Pricing Model (CAPM) can give investors some helpful indications of stock valuation and risk measurement of investment, it still has a variety of limitations while it brings convenience to the investors. The most serious influential factor of the accuracy or deviation from the real situations can come from the assumptions.

However, CAPM is based on the following assumptions: [6]

- 1.All investors are risk-averse by nature.
- 2.Investors have the same time period to evaluate information.
- 3.There is unlimited capital to borrow at the risk-free rate of return.
- 4.Investments can be divided into unlimited pieces and sizes.
- 5.There are no taxes, inflation, or transaction costs.
- 6.Risk and return are linearly related.

These assumptions are too ideal for investment measurement and may be unrealistic in the real stock market.

Taking an example of the case of borrowing, CAPM assumes that all investors can lend and borrow infinite capital at a risk-free interest rate. However, it can be pretty ideal and unrealistic in real investment operations. Generally, investors take loans according to their credits or existing assets as mortgages, which are limited. Therefore, the capital employed is limited in the market. As a result, they cannot respond to market changes fully according to the expectation of CAPM due to the limited cash flow and the information and operations may have a time lag, leading to inefficiency in decision-making in investment.

Additionally, investors cannot have the same expectations as assumed in CAPM, because their expectations may be measured differently. First, investors may assume different levels of the risk-free interest rate(r_f). Some individuals and financial institutions may set US Ten-Year Treasury Bonds as the r_f , while others may take the value of US Five-Year Treasury Bonds, for example. Hence, the statistical results formed may differ from each other, leading to different expected prices of stocks. As the Expected return can be defined as

$$E(r_i) = r_f + \beta_{im}(E(r_m) - r_f) \quad [2] \quad (4)$$

In CAPM, investors who assume higher R_f will get a higher expected return, which overestimates the real return of stocks, while others who take low r_f may underestimate the real returns of investment. Meanwhile, if investors who use CAPM get different expectations, the CAPM is unable to get an accurate expectation to investors who use it, as the assumption of the same expectation has been invalid.

Second, investors may have various understandings of the stock market. Some may be irrational especially when the prices of stocks are lower than their expectations and for those who are risk-intolerant. When stock prices fluctuate and be lower than their expectations, they may sell their stocks urgently to reduce loss, though this action may not work sometimes. However, the irrationalness of the investors can be a great force that goes against the assumption of the CAMP and the efficient market hypothesis, which assume that.

5. Conclusion and Recommendation

In conclusion, the main difference between systematic and non-systematic risks depends on whether or not the risk of investment is diversifiable, where the systematic risks are diversifiable and the other type is not. The distinction can also be made by different causes of risks.

This process can be helpful and important for investors to understand the differences between systematic and non-systematic risks as the risks involved in their investment portfolio can be controlled more properly according to their risk preferences by understanding and distinguishing risks.

Also, the investment portfolio might be more efficient and more balanced between the goals of low-risk level and high return if CAPM is used. Using calculated beta values, the investors can understand the level of systematic risks, and invest in the assets with proper weight, in a dynamic changing stock market. When the capital market is expected and considered as a bull, the assets with high beta values, which are higher than 1, can be invested more, as the return may be enlarged significantly, while the selection could be the opposite when the capital market tends to be bearish. Additionally, in the neutral cases, the assets with a beta value close to 1 may weigh more, where high beta value assets and low beta value assets could also account for a large proportion aiming for receiving higher returns and hedging non-systematic risks when the market conditions vary instantly, so the investors can keep their portfolio, with less frequent variations to their original investment proportions.

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