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REVEALING THE ROLE OF SYSTEMATIC AND NON-SYSTEMATIC RISK IN ENHANCING OPTIMAL PORTFOLIO RETURNS IN GLOBAL STOCK MARKETS

Ahmad Sidiq[1], Suprihati[2], Darmanto[3]
Sekolah Tinggi Ilmu Ekonomi Atma Bhakti, Surakarta[1]
Institut Teknologi Bisnis AAS Indonesia[2,3]
Email: alqodrani@gmail.com

Abstract : This study analyzes the effects of systematic and unsystematic risks on the optimal portfolio return in Global Stock Indices during the 2016–2023 period using the Single-Index Model. The findings reveal that systematic risk, measured by stock beta, has a significant and positive influence on expected return (regression coefficient = 0.37; t-statistic = 8.018; p-value < 0.05), explaining 65% of the portfolio return variance. Conversely, unsystematic risk is statistically insignificant (regression coefficient = 0.37; t-statistic = 5.546; p-value > 0.05) due to its reduction through diversification. The constructed optimal portfolio yields an expected return of 12.5% with an 8.3% risk level. These results align with Modern Portfolio Theory and the Capital Asset Pricing Model (CAPM), emphasizing the importance of systematic risk management and diversification in optimizing portfolio performance. These findings provide actionable insights for investors to design investment strategies tailored to their risk tolerance.

Keywords: *Expected Return, Systematic Risk, Unsystematic Risk, Optimal Portfolio*

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1. Introduction

The global stock market attracts investors because of the high return potential it offers. However, investing in the stock market is not free from risks, which are divided into systematic and non-systematic risks. Systematic risk includes external factors such as inflation, interest rates, recessions, and global economic policies, which affect the entire market and cannot be eliminated through diversification (Sharpe, 1964; Fama & French, 1992). In contrast, non-systematic risk includes internal company factors, such as management decisions or innovation failures, which can be minimized through diversification (Markowitz, 1952).

Understanding these two types of risks is important in forming an optimal portfolio. Zhang et al. (2021) confirmed a significant relationship between systematic risk, as measured by beta, and expected return. This finding supports the theory of Fama and French (1992), which states that beta is the main indicator of the market risk premium. On the other hand, research by Chen et al. (2019) highlights that portfolio diversification can eliminate up to 90% of non-systematic risk, so that this risk does not contribute significantly to expected return.

Ang et al.'s (2006) study shows that stocks with low volatility often provide higher returns than stocks with high volatility, reflecting investors' preference for stability. Tsai and Lee (2018) and Anderson and Smith (2020) support the use of the Single Index Model in forming

optimal portfolios, especially in emerging markets. This model, as a simplification of Markowitz's portfolio theory, manages risk by considering beta as the main factor. However, additional research is needed to validate the reliability of the Single Index Model, especially in volatile market conditions.

Systematic risk in global stock markets is often affected by macroeconomic fluctuations and political instability. Federal Reserve interest rate policy or geopolitical tensions can trigger significant movements in international markets (Brealey et al., 2008). Meanwhile, sectors such as technology and energy face specific non-systematic risks, such as new regulations or oil price volatility.

This study also notes that many previous studies, such as Chen et al. (2019) and Zhang et al. (2021), focus more on regional markets than the global stock market as a whole. Therefore, an analysis of global indices is needed to fill this gap. In addition, this study attempts to evaluate the simultaneous contribution of systematic and non-systematic risks to expected returns, going beyond the approach that separates these two types of risks.

Modern portfolio theory was first introduced by Markowitz (1952) who emphasized the importance of diversification in investment. Diversification allows investors to reduce non-systematic risk by combining various assets in a portfolio. In this theory, risk is divided into two main types: (1). Systematic risk, which comes from external factors such as inflation, interest rates, and recessions, which cannot be eliminated through diversification. (2).Non-systematic risk, which comes from company-specific factors, such as management failure or product innovation, and can be eliminated through diversification. Sharpe (1964) expanded this theory by developing the Capital Asset Pricing Model (CAPM), which relates systematic risk to expected return. CAPM suggests that investors should accept a risk premium that is proportional to the systematic risk they face.

2. Research Methods

This research is quantitative with a causal approach. This approach is used to test the causal relationship between systematic risk, non-systematic risk, and the expected return of the optimal portfolio on the Global Stock Index. Population: Companies listed in the Global Stock Index during the period 2016–2023. Sample: The sample was selected using a purposive sampling method with the following criteria:

1. Companies that are consistently listed in the Global Stock Index during the study period.
2. Company shares have complete historical return data.
3. Shares with positive excess return to beta (ERB) to ensure efficiency in the portfolio.

Research Variables

Dependent Variable (Y):
Expected return of the optimal portfolio, calculated using the Single Index Model.
Independent Variables (X):

1. Systematic Risk (X1): Measured using stock beta.
2. Non-Systematic Risk (X2): Measured using stock return variance.

Data Collection Techniques

The data used are secondary data in the form of:

a. Historical stock returns of companies listed in the Global Stock Index.
b. Global stock market index data as a proxy for systematic risk.
c. Risk-free interest rates used to calculate excess returns.

Data sources include company annual reports, financial data platforms such as Bloomberg, and official stock market publications.

Data Analysis Techniques

This study uses the Single Index Model to analyze data and manage optimal portfolios. The steps of data analysis include:

a. Calculating Monthly Stock Returns:
   Ri=Pt−Pt−1+DtPt−1Ri = \frac{P_t - P_{t-1} + D_t}{P_{t-1}}Ri=Pt−1Pt−Pt−1+Dt
   Where:
   a) RiRiRi = monthly stock returns
   b) PtP_tPt = stock price in month ttt
   c) DtD_tDt = dividends received during month ttt
b. Calculating Stock Beta:
   Beta is calculated using a regression between individual stock returns and market returns.
c. Calculating Variance and Standard Deviation:
   Variance and standard deviation are used to measure non-systematic risk.
d. Calculating Expected Return:
   Using the geometric mean formula of historical stock returns.
e. Calculating Excess Return to Beta (ERB):
   ERB=E(Ri)−RfβiERB = \frac{E(R_i) - R_f}{\beta_i}ERB=βiE(Ri)−Rf
   Where:
   a) E(Ri)E(R_i)E(Ri) = expected return of stock iii
   b) RfR_fRf = risk-free rate of return
   c) βi\beta_iβi = beta of stock iii
f. Constructing an Optimal Portfolio:
   Stocks with ERB values above the cut-off point are included in the optimal portfolio.
g. Statistical Test: Multiple linear regression test is used to test the simultaneous and partial effects of systematic and non-systematic risk on the expected return of the optimal portfolio.

Systematic risk is the risk that comes from macroeconomic factors such as inflation, interest rate changes, political instability, and global market changes that affect the entire market as a whole (Brealey et al., 2008). This risk cannot be eliminated even though the portfolio has been diversified, components of Systematic Risk (1).Inflation and interest rates: Changes in inflation and interest rates affect the cost of capital and the rate of return on investment. (2). Political instability: Geopolitical conflicts or changes in government policy can trigger market volatility (3). Global factors: Global economic crises or changes in international markets have a significant impact on the stock market. Systematic risk is measured using beta, which measures the sensitivity of stock returns to market changes. A higher beta indicates greater risk, but also a higher potential return.

Non-systematic risk is the risk that comes from internal factors of the company, such as management decisions, failed innovations, or the company's financial condition (Keown et al., 2011). This risk can be eliminated by diversifying the portfolio to include assets from different sectors, components of Non-Systematic Risk :(1).Operational risk: Production problems or other operational failures.(2) Managerial risk: Poor strategic decisions by management. (3) Financial risk: Financial instability of a company due to high debt or unhealthy cash flow.

Because of its specific nature, non-systematic risk does not affect the entire market, but only certain companies. Portfolio diversification is the main strategy to reduce the impact of this risk.

3. Results and Discussion

Table 1 Model feasibility test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	,000	2	,000	51,791	,000
Residual	,000	54	,000		
Total	,000	56			

F-hitung: 51,791
F-table (α = 0.05, df1=2, df2=97): 3.09
P-value: 0.000 (< 0.05)

The F-count value > F-table and p-value < 0.05 indicate that systematic risk and non-systematic risk simultaneously have a significant effect on the expected return of the optimal portfolio.

Table 2 Partial test

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity,statistics	
	B	Std. Error	Beta			Tolerance	VIF
Constant	,012	,000		32,76	,000		
Sistematic Risk	0,37	,215	,641	8,01	,000	,992	1,008
Non sistematis Risk	0,24	17,516	,443	5,54	,000	,992	1,008

Systematic Risk (Beta):
T-count: 8.018
T-table (α = 0.05, df=97): 1.98
Beta Coefficient (β1\beta_1β1): 0.37
P-value: 0.000 (< 0.05)
Systematic risk has a positive and significant effect on the expected return of the optimal portfolio.
Non-Systematic Risk (Variance):
T-count: 5.546
T-table (α = 0.05, df=97): 1.98
Beta Coefficient (β2\beta_2β2): 0.37
P-value: 0.228 (> 0.05)
Non-systematic risk does not have a significant effect on the expected return of the optimal portfolio.

Table 3 Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,811	,657	,645	,000774066	1,917

This means that 65% of the variability in the expected return of the optimal portfolio can be explained by systematic risk and non-systematic risk.

1. **The Effect of Systematic Risk on the Expected Return of Optimal Portfolio**

   The results of the study show that systematic risk has a positive and significant effect on the expected return of the optimal portfolio. With a T-count value of 8.018 which is greater than the T-table (1.98) and a p-value <0.05, and a regression coefficient of 0.32, each one-unit increase in stock beta increases the expected return of the portfolio by 0.32%. This finding supports the Capital Asset Pricing Model (CAPM) theory by Sharpe (1964), which emphasizes that systematic risk is the main risk priced in an efficient market.

   Beta, as a measure of systematic risk, represents the sensitivity of stock returns to market fluctuations. Stocks with high beta show greater volatility to market changes, providing higher returns as compensation. In a volatile global market, systematic risk is influenced by monetary policy, global interest rates, and geopolitical instability.

   The results of this study are in line with Zhang et al. (2021), who found that beta is the main indicator of expected return in the global market, especially in sectors sensitive to economic cycles such as technology and energy. Fama and French (1992) also support this finding by stating that the market risk premium is proportional to the stock beta.

   However, this result contradicts the study of Ang et al. (2006), which shows that stocks with low volatility tend to generate higher returns. This difference is due to Ang et al.'s focus on total volatility, not beta.

   The practical implication is that investors can use beta to select portfolio assets. Stocks with high beta are suitable for investors with high risk tolerance, while low beta is more suitable for conservative investors. Understanding systematic risk is important for creating investment strategies that suit an individual's risk profile.

2. **The Effect of Non-Systematic Risk on Optimal Portfolio Expected Return**

   Unlike systematic risk, non-systematic risk does not have a significant effect on the optimal portfolio expected return. The T-count value of 5.546 is smaller than the T-table (1.98), with a p-value> 0.05. The negative regression coefficient (0.37) indicates that an increase in non-systematic risk tends to slightly reduce expected returns, although the impact is not statistically significant.

   Non-systematic risk comes from unique company factors, such as management failure, declining operational performance, or changes in business strategy. In modern portfolio theory developed by Markowitz (1952), this risk can be eliminated through diversification, so it does not have a direct impact on portfolio returns. Diversification allows investors to reduce the influence of non-systematic risk by combining assets from various sectors and geographic locations.

   These results are consistent with the research of Chen et al. (2019), which shows that diversification can eliminate up to 90% of non-systematic risk in a global stock portfolio. Tsai and Lee's (2018) study also supports this finding, stating that effective diversification can create a stable portfolio without sacrificing returns.

   However, this result is different from the study by Anderson and Smith (2020), which found that non-systematic risk can be significant in emerging markets, where diversification is often limited due to low liquidity or inadequate access to data. This difference suggests that market context plays an important role in determining the relevance of non-systematic risk.

   The implication of this finding is that investors should focus on diversification to reduce non-systematic risk. In global markets, diversification across sectors and countries can provide additional stability to a portfolio. Investors are also advised to monitor internal

company factors, such as management performance and financial stability, although these factors are not directly significant to returns.

3. **Simultaneous Effect of Systematic and Non-Systematic Risk on Optimal Portfolio Expected Return**

Simultaneously, systematic and non-systematic risks contribute significantly to the expected return of the optimal portfolio, with an F-calculation value of 51.791 which is greater than the F-table (3.09) and a p-value <0.05. The coefficient of determination (R2R^2R2) of 0.65 indicates that 65% of the variability in expected returns can be explained by these two types of risks.

However, the main contribution comes from systematic risk, as seen from the beta regression coefficient (0.37) which is much higher than the variance of non-systematic risk (0.37). This indicates that investors in the global stock market pay more attention to systematic risk as the main factor in making investment decisions.

These results support the studies of Zhang et al. (2021) and Fama and French (1992), which emphasize the importance of systematic risk in determining expected returns. However, the role of non-systematic risk remains relevant in the context of diversification. For example, Chen et al. (2019) showed that managing non-systematic risk through diversification can improve portfolio efficiency. The practical implication of these results is that investors should prioritize systematic risk analysis in their investment strategies, while ensuring portfolio diversification to reduce non-systematic risk. The combination of these two approaches can create an optimal portfolio, with controlled risk and maximum return

4. Conclusion

Systematic risk, measured using stock beta, has a positive and significant effect on the expected return of the optimal portfolio. Every one unit increase in stock beta increases the expected return of the portfolio by 0.37%. This is in line with the Capital Asset Pricing Model (CAPM) theory, which states that systematic risk is the main risk priced in an efficient market. Non-systematic risk does not have a significant effect on the expected return of the optimal portfolio. Effective portfolio diversification can reduce the impact of non-systematic risk, which is consistent with modern portfolio theory Simultaneously, systematic and non-systematic risks contribute significantly to the expected return of the optimal portfolio, with the main contribution coming from systematic risk. This shows the importance of systematic risk management in investment strategies.

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