ASSET PRICING, SYSTEMATIC RISK AND EXPECTED RETURNS: AN EMPIRICAL COMPARISON OF CAPM AND MULTIFACTOR MODELS.

ABSTRACT:

Asset pricing models play an important role in understanding how investors are compensated for taking risk and how expected returns are determined across different securities and investment environments. Among these models, the Capital Asset Pricing Model (CAPM) remains one of the most influential frameworks because of its relatively simple explanation of expected return through systematic market risk and beta. However, extensive empirical research has questioned whether market beta alone is sufficient to explain differences in realized returns. The development of multifactor models, particularly the Fama-French and Carhart frameworks, reflects the growing recognition that characteristics such as firm size, value, profitability, investment and momentum may also be associated with return differences.

This study examines the relationship between systematic risk, beta and expected returns while critically comparing CAPM with selected multifactor asset-pricing approaches. The research is based primarily on secondary research material covering firm- and portfolio-level observations across different markets and asset classes, together with the academic literature on asset pricing. The study focuses on beta, expected return, Jensen's alpha and additional systematic risk factors, while considering differences across developed and emerging markets. The analytical framework is comparative and empirical in orientation, with attention to the extent to which different models provide useful explanations of return behaviour. The study contributes to the broader understanding of why a single-factor framework may not be sufficient across all investment settings and highlights the importance of considering market characteristics and additional sources of systematic risk. The findings are intended to provide useful insights for investors, portfolio managers, analysts and financial decision-makers evaluating risk-adjusted investment performance.

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Keywords:

Capital Asset Pricing Model (CAPM), Beta, Systematic Risk, Expected Return, Asset Pricing Models, Fama-French Model, Multifactor Models, Equity Returns

JEL Classification: G11, G12, G15, C32

INTRODUCTION

Investment decisions are fundamentally concerned with a simple but difficult question: what return should an investor expect for the risk being taken?Although this question appears straightforward, determining the appropriate relationship between risk and return has remained one of the central problems in financial economics. Investors do not simply seek high returns; they seek returns that adequately compensate them for the risks associated with an investment. Understanding this relationship is therefore important for portfolio construction, security valuation, performance evaluation and financial decision-making.

Risk in financial markets can broadly be divided into systematic and unsystematic components. Unsystematic risk arises from factors specific to an individual company or security and can, at least theoretically, be reduced through diversification. Systematic risk, in contrast, reflects market-wide influences that cannot easily be eliminated through diversification. Interest-rate movements, economic conditions, market sentiment, inflation, policy changes and broader financial-market shocks can affect securities simultaneously. The distinction between these two forms of risk provides the foundation for modern portfolio and asset-pricing theory.

The Capital Asset Pricing Model (CAPM) represents one of the most influential attempts to establish a systematic relationship between risk and expected return. In its traditional form, CAPM proposes that the expected return on an asset is determined by the risk-free rate plus compensation for the asset's exposure to market risk. This exposure is captured through beta. An asset with a higher beta is expected to have greater sensitivity to movements in the market portfolio and, under the CAPM framework, should therefore offer a higher expected return.

The appeal of CAPM lies partly in its simplicity. By reducing systematic risk to a single market factor, the model provides investors with an intuitive method of evaluating whether the expected return on an asset is appropriate given its market exposure. Beta also became an important measure for comparing securities and assessing portfolio risk.

However, empirical research has increasingly questioned whether beta by itself can adequately explain differences in average returns. Fama and French's influential examination of the cross-section of stock returns found that size and book-to-market characteristics contained information about average returns beyond the role attributed to market beta. Their evidence helped shift asset-pricing research toward multifactor explanations.

This development did not mean that CAPM became irrelevant. Instead, it highlighted an important distinction between a model's theoretical usefulness and its empirical completeness. CAPM remains a valuable benchmark because of its clear interpretation and practical simplicity. At the same time, multifactor models attempt to capture additional dimensions of systematic risk that may be overlooked by a single-factor approach.

The Fama-French three-factor model expanded the traditional market-risk framework by incorporating size and value factors. Subsequent developments added profitability and investment, producing the Fama-French five-factor model. Fama and French reported that their five-factor framework performed better than their earlier three-factor model in the sample examined, although they also identified limitations, including difficulty explaining certain low-return small firms.

Momentum provided another important extension to asset-pricing research. The Carhart four-factor framework incorporated momentum into a Fama-French-style model, reflecting evidence that past return behaviour could contain information relevant to subsequent performance. The evolution from CAPM toward increasingly detailed multifactor models illustrates the broader development of asset-pricing research: rather than asking only whether market beta explains returns, researchers increasingly examine **which sources of systematic risk are priced and whether their relevance changes across markets and periods**.

This question becomes particularly important when examining emerging markets. Market structure, liquidity, investor composition, information availability, institutional characteristics and economic conditions may differ substantially between emerging and developed markets. Consequently, a model that performs effectively in one market may not necessarily produce the same explanatory power elsewhere.

The same issue arises across asset classes. Equity markets, investment funds, renewable-energy assets, real estate, cryptocurrencies and sustainable portfolios may respond differently to systematic risk. The research material considered in this study reflects this diversity, containing observations related to African equities, international funds, renewable energy, South African equities, sustainable and Shariah-compliant portfolios, Vietnamese equities, US and Indian equities, cryptocurrencies, real estate and other investments.

More recent asset-pricing research has consequently moved beyond conventional market, size and value factors. Profitability, investment, momentum and liquidity have received substantial attention, while other approaches have examined conditional risk, higher moments, stochastic beta, downside risk, ESG and climate-related risks. These developments suggest that systematic risk should not necessarily be viewed as a fixed concept. Its relevant dimensions may depend on the market, asset class, economic environment and investment horizon.

The Indian market provides an especially relevant setting for such analysis. As an emerging financial market with a diverse listed corporate sector and increasing participation from domestic and international investors, India offers an appropriate context for examining whether traditional market-risk measures remain sufficient for explaining return behaviour. At the same time, comparisons with international evidence can help distinguish general asset-pricing relationships from market-specific characteristics.

Against this background, the present study examines the relationship between systematic risk, beta and expected returns and evaluates the relevance of CAPM relative to multifactor asset-pricing approaches. Rather than treating one model as universally superior, the study considers how model performance may differ according to market, asset class, risk factors and investment setting. The central objective is therefore to develop a comparative understanding of asset pricing and to assess whether additional systematic factors provide useful information beyond traditional market beta.

REVIEW OF LITERATURE

Foundations of CAPM

The Capital Asset Pricing Model is built around the principle that investors should be compensated for systematic risk because diversified investors can largely eliminate security-specific risk. Under the traditional framework, the relevant risk of an individual security is therefore its covariance with the market portfolio, represented through beta.

The CAPM expected-return relationship can be expressed as:

$$\mathbf{E(R_i) = Rf + \beta_i\,[E(Rm) - Rf]}$$

where $E(R_i)$ represents the expected return of asset *i*, Rf represents the risk-free rate, β_i represents the asset's market beta and E(Rm) represents the expected market return.

The model provides an economically intuitive framework. The term **E(Rm) − Rf** represents the market risk premium, while beta indicates how strongly an asset responds to market movements. A beta above one indicates greater sensitivity to market movements, while a beta below one indicates lower sensitivity.

The conceptual strength of CAPM lies in its ability to reduce a complex investment decision to a single systematic-risk measure. This simplicity has contributed significantly to its continued use in finance and investment analysis.

However, the model depends on a number of restrictive assumptions concerning investor behaviour, market structure, expectations, borrowing and lending, and the characteristics of the market portfolio. These assumptions create an important distinction between CAPM as a theoretical benchmark and CAPM as an empirical description of actual markets.`X

The Capital Asset Pricing Model (CAPM) is one of the most influential frameworks in modern financial economics. The model was developed through the work of Sharpe (1964), Lintner (1965) and Mossin (1966). CAPM proposes that investors should be compensated for the time value of money and for the systematic risk associated with an investment. Security-specific risk is assumed to be diversifiable, while market-wide risk remains relevant to a well-diversified investor (Sharpe, 1964; Lintner, 1965; Mossin, 1966).

The importance of CAPM extends beyond its theoretical contribution. The model has been widely used as a benchmark for estimating expected returns, evaluating investment performance and understanding the cost of equity. However, its relatively simple structure has also generated considerable empirical debate regarding whether market beta alone can adequately explain observed return differences (Fama & French, 1992).

Empirical Evidence on Beta and Expected Returns

The empirical relationship between beta and expected returns has been one of the most extensively examined issues in asset-pricing research. CAPM predicts a positive relationship between systematic market risk and expected return. However, subsequent evidence has questioned whether this relationship is sufficiently strong to explain the cross-section of stock returns.

Fama and French (1992) examined the cross-section of expected stock returns and found that firm size and book-to-market equity were important in explaining differences in average returns. Their analysis suggested that when variation in beta unrelated to firm size was considered, the relationship between beta and average return was relatively weak in their sample. (Fama and French (1992))

This finding was important because it challenged the proposition that market beta should be the primary variable explaining differences in expected returns. Rather than suggesting that systematic risk is irrelevant, the findings encouraged researchers to investigate whether beta was an incomplete measure of the systematic risks embedded in securities.

The literature also raises concerns regarding the stability of beta. A firm's business conditions, financial leverage, industry exposure and broader economic environment can change over time. As a result, an estimated historical beta may not necessarily represent the firm's future systematic-risk exposure. This issue is particularly relevant when comparing securities across different investment periods and markets.

Development of the Fama-French Three-Factor Model

The empirical limitations of CAPM contributed to the development of multifactor asset-pricing models. Fama and French (1993) extended the market factor by introducing size and value factors. Their three-factor model incorporates the market excess return, the size factor (SMB) and the value factor (HML).

The model can be represented as:

$$\mathbf{R_i - Rf = \alpha_i + \beta m(MKT) + \beta s(SMB) + \beta v(HML) + \varepsilon_i}$$

The **SMB (Small Minus Big)** factor captures differences associated with firm size, while **HML (High Minus Low)** captures differences associated with book-to-market characteristics. The development of these factors reflected the evidence that size and value characteristics could help explain cross-sectional variation in returns beyond the traditional market factor (Fama & French, 1992, 1993).

The significance of the Fama-French framework lies in its movement away from a purely single-factor explanation of asset returns. Instead, the model considers several systematic dimensions that may influence expected returns.

Carhart Four-Factor Model and Momentum

The development of multifactor models continued with the recognition of momentum as an important source of return variation. Carhart (1997) extended the Fama-French three-factor model by incorporating a momentum factor, resulting in a four-factor framework consisting of market, size, value and momentum factors. (Carhart (1997))

Carhart (1997) examined persistence in mutual fund performance and found that common factors in stock returns and investment expenses explained much of the persistence in mutual fund returns. The study also indicated that the apparent persistence in mutual fund performance was substantially related to the one-year momentum effect in stocks. (Carhart (1997))

The inclusion of momentum was important because it demonstrated that return behaviour could not necessarily be explained only through market risk and accounting-based characteristics. Past price performance could also provide information relevant to subsequent returns.

At the same time, the addition of momentum illustrates a broader challenge in asset pricing: a factor may improve empirical explanation without necessarily providing a complete theoretical explanation for why the factor should command a risk premium. This distinction remains important when evaluating multifactor models.

Fama-French Five-Factor Model

Fama and French (2015) further expanded their three-factor framework by incorporating profitability and investment. The resulting five-factor model includes market, size, value, profitability and investment factors. (Fama and French (2015))

The five-factor model was developed to capture additional patterns in average stock returns associated with profitability and investment behaviour. Fama and French (2015) reported that the five-factor model performed better than their earlier three-factor model in the sample examined. However, they also identified an important limitation: the model did not adequately explain the low average returns of certain small firms with high investment and low profitability. (Fama and French (2015))

The study also found that the value factor became largely redundant for explaining average returns once profitability and investment factors were included. (Fama and French (2015)) This finding is important because it demonstrates that the explanatory contribution of a factor can change depending on which other factors are incorporated into the model.

The five-factor literature therefore provides support for a broader understanding of systematic risk while simultaneously demonstrating that adding factors does not necessarily result in a universally complete asset-pricing model.

Comparison of CAPM and Multifactor Models

The comparison between CAPM and multifactor models represents a major theme in modern asset-pricing research. CAPM has the advantage of simplicity because it reduces systematic risk to market exposure through beta. Multifactor models, in contrast, incorporate several sources of systematic return variation and therefore provide a potentially broader explanation of asset returns.

Fama and French (1992) provided early empirical evidence that size and book-to-market equity contained information about average stock returns beyond the traditional market-beta relationship. (Fama and French (1992)) The subsequent three-factor model formalised these relationships (Fama & French, 1993), while Carhart (1997) incorporated momentum and Fama and French (2015) added profitability and investment. (Carhart (1997))

The literature therefore suggests that multifactor models can provide additional explanatory information beyond CAPM. However, this does not mean that a multifactor model will necessarily perform better in every market or for every asset class. Model performance can depend on the sample period, market structure, asset characteristics and factors included.

Consequently, the relevant research question is not simply whether CAPM or a multifactor model is "better." Rather, it is important to examine **which factors are relevant in a particular investment environment and whether their inclusion provides meaningful additional explanatory power**.

Asset Pricing in Emerging Markets

Emerging markets provide an important setting for evaluating asset-pricing models because their financial-market structures can differ from those of developed economies. Differences in liquidity, information availability, investor participation, market depth, regulation and corporate characteristics can influence the relationship between risk and return.

The broader asset-pricing literature therefore suggests that findings from developed markets cannot automatically be generalised to emerging markets. The relevance of beta and additional factors may differ depending on the country's financial-market structure and economic conditions.

This issue is particularly relevant to the present study because the research material includes evidence from markets such as India, South Africa, Vietnam and other African and emerging-market economies. Comparing evidence across these markets provides an opportunity to examine whether systematic-risk relationships remain consistent across different financial environments.

The literature therefore supports a comparative approach in which CAPM and multifactor models are evaluated across different markets rather than assuming that a single model will perform uniformly.

Asset Pricing across Different Asset Classes

Asset-pricing research has also expanded beyond traditional listed equities. The research material considered in the present study includes evidence relating to international funds, renewable-energy investments, sustainable portfolios, Shariah-compliant portfolios, cryptocurrencies, real estate and other asset classes.

This broader asset coverage is important because different asset classes can be exposed to different sources of systematic risk. Conventional equities may be strongly influenced by market, size and value factors, whereas cryptocurrencies, real estate and renewable-energy investments may have additional exposures related to liquidity, regulation, macroeconomic conditions, technology or sector-specific developments.

Consequently, the effectiveness of an asset-pricing model should be considered in relation to the characteristics of the asset being examined. A model developed primarily to explain conventional equity returns cannot automatically be assumed to provide an equally comprehensive explanation for every alternative asset.

ESG, Sustainability and Climate-Related Risk

The emergence of sustainable investing has introduced additional dimensions into asset-pricing research. Environmental, social and governance characteristics can potentially influence investor preferences, corporate financing conditions, reputation, future cash flows and firm valuation.

The literature supplied for the present research includes studies examining ESG performance, sustainable portfolios, green investments and climate-policy uncertainty. These studies indicate that environmental and sustainability-related variables may be relevant to return behaviour in particular market settings.

Climate-related risk is especially relevant because changes in environmental regulation and climate policy can affect companies differently depending on their industries and business models. Such risks may therefore create additional variation in expected returns.

However, ESG and climate-related variables should not automatically be considered substitutes for traditional market-risk factors. Instead, they can be viewed as potentially additional sources of systematic risk that may become particularly important for certain sectors, portfolios and investment environments.

Conditional and Extended Asset-Pricing Models

The limitations of traditional CAPM and standard multifactor models have led to the development of several extensions. Conditional CAPM allows risk exposures and expected returns to vary according to changing market conditions. Such approaches are particularly relevant when beta is not stable over time.

Other extensions incorporate liquidity, downside risk and higher moments of return distributions. Liquidity-adjusted models recognise that the ability to trade an asset can itself be a source of systematic risk. Higher-moment models consider characteristics such as skewness and kurtosis, while downside-risk approaches focus specifically on negative deviations from expected returns.

These developments demonstrate that systematic risk is increasingly viewed as a multidimensional and potentially time-varying concept rather than simply a fixed market-beta measure.

Synthesis of the Literature

The literature demonstrates a clear progression in asset-pricing research. The CAPM established market beta as a central measure of systematic risk and provided a simple theoretical relationship between risk and expected return (Sharpe, 1964; Lintner, 1965; Mossin, 1966). Subsequent empirical evidence questioned whether beta alone could explain differences in expected returns, particularly following the findings of Fama and French (1992). (William F. Sharpe)

The Fama-French three-factor model expanded the framework by incorporating size and value (Fama & French, 1993). Carhart (1997) subsequently added momentum, while Fama and French (2015) introduced profitability and investment into their five-factor model. (Mark M. Carhart)

The literature therefore indicates that market risk remains an important component of asset pricing, but market beta may not provide a complete explanation of return differences. Multifactor models provide a broader framework, yet they also have limitations. For example, Fama and French (2015) identified return patterns that remained unexplained even by their five-factor model. (Fama and French (2015))

A further theme emerging from the literature is that **asset-pricing model performance is context-dependent**. Differences across countries, asset classes, investment periods and economic conditions can affect the relevance of individual risk factors. This is particularly important for emerging markets and newer investment categories.

Overall, the literature supports the continued use of CAPM as a benchmark while also providing a strong rationale for examining multifactor approaches. The development of size, value, momentum, profitability and investment factors, together with more recent interest in liquidity, ESG and climate-related risks, demonstrates the continuing evolution of research into systematic risk and expected returns. The present study builds on this literature by comparatively examining CAPM and multifactor approaches across the markets and asset classes represented in the available research material.

7. RESEARCH GAP

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Although asset-pricing research has developed significantly, several important gaps remain in understanding the relationship between systematic risk and expected returns. Traditional CAPM provides a simple framework in which market beta is used as the primary measure of systematic risk. However, empirical evidence across different markets and asset classes suggests that beta alone may not always provide a complete explanation of differences in returns.

One major gap is the **inconsistent performance of CAPM across different markets and investment environments**. The relationship between beta and returns may vary depending on market conditions, economic structure, investment horizon and the characteristics of individual securities. Therefore, a model that performs effectively in one market may not necessarily provide the same level of explanation in another.

A second gap is the **limited integration of different asset-pricing approaches within a common comparative framework**. Asset-pricing research has progressed from CAPM to multifactor models incorporating additional factors such as size, value, profitability, investment and momentum. However, these models are often examined separately or within specific market settings. There is scope for a broader comparison that considers the relative relevance of these models across different markets and asset classes.

A third gap concerns the **limited comparability of asset-pricing evidence across asset classes**. Traditional research has largely concentrated on equities, while more recent research has expanded into investment funds, renewable energy, sustainable portfolios, real estate, cryptocurrencies and other alternative assets. These asset classes have different economic characteristics and may be exposed to different sources of systematic risk. Consequently, the effectiveness of a particular asset-pricing model may differ considerably across them.

Another important gap relates to the **changing nature of systematic risk**. Traditional asset-pricing approaches primarily focus on market risk and beta, while contemporary research increasingly considers factors such as liquidity, momentum, profitability, investment behaviour, ESG characteristics and climate-related risks. However, the relative importance of these factors is not consistent across all investment environments.

There is also a need for greater understanding of **developed versus emerging markets**. Emerging markets can differ from developed markets in terms of liquidity, information availability, investor participation, market depth, regulation and economic conditions. These differences may influence the relationship between systematic risk and expected returns and may affect the applicability of traditional and multifactor models.

The literature therefore leaves an important unresolved question: **Is market beta sufficient to explain expected returns across different investment environments, or do additional systematic-risk factors provide a more comprehensive explanation?**

Specific Research Gap

The present study addresses this gap by comparatively examining **CAPM and multifactor asset-pricing models** in relation to systematic risk and expected returns. The study focuses on beta as the traditional measure of market risk while considering additional factors such as size, value, profitability, investment, momentum and liquidity where relevant to the available data.

Rather than assuming that one asset-pricing model is universally superior, the study seeks to understand **how the relevance of different risk factors varies across markets, asset classes and investment environments**. This comparative approach provides a broader understanding of asset pricing and helps connect the traditional concept of systematic risk with the wider range of factors considered in contemporary asset-pricing research.

SCOPE AND LIMITATIONS OF THE STUDY

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Scope of the Study

The study focuses on understanding the relationship between **systematic risk, beta and expected returns** and examines how traditional and multifactor asset-pricing models can be used to explain return behaviour. The primary focus is on the **Capital Asset Pricing Model (CAPM)** and its comparison with selected multifactor approaches.

The geographical scope of the study is broad and includes evidence from both **developed and emerging markets**. The research material covers markets and investments associated with countries and regions such as India, South Africa, Vietnam, the United States and African markets. This allows the study to consider whether the relationship between risk and return remains consistent across different market environments.

The study also covers multiple **asset classes**, including equities, investment funds, renewable-energy investments, sustainable portfolios, Shariah-compliant portfolios, cryptocurrencies, real estate and other investments represented in the available research material. This broader scope helps examine whether different asset classes exhibit different systematic-risk characteristics.

From a theoretical perspective, the study primarily considers **CAPM, beta, Jensen's alpha and multifactor asset-pricing models**. Where supported by the available data and literature, the analysis also considers factors such as **size, value, profitability, investment, momentum and liquidity**. Selected extensions of asset-pricing models, including conditional, liquidity-adjusted, higher-moment and other approaches, are considered to understand the evolution of asset-pricing theory.

The key variables considered in the study include **expected return, realized return, beta, systematic market risk and additional factor exposures**. Jensen's alpha is also considered as an indicator of performance relative to the expected return generated by an asset-pricing model.

The study is primarily based on **secondary data and existing empirical research material**. The available firm- and portfolio-level information provides a basis for comparing risk and return characteristics across different investments, while the literature provides the theoretical and empirical context for interpreting these relationships.

The study is intended to be useful to **investors, portfolio managers, financial analysts, researchers, students and other financial decision-makers** who are interested in understanding how different approaches to systematic risk can influence the evaluation of expected returns.

Limitations of the Study

The study has several limitations that should be considered when interpreting its findings.

First, the study relies primarily on **secondary data and previously available research material**. As a result, the researcher has limited control over the original data collection methods, sample selection and measurement procedures used in the underlying studies.

Second, the available data cover **different markets, asset classes and investment periods**. While this diversity provides useful comparative insights, it also creates challenges in making direct comparisons because the observations may have been generated under different economic and financial conditions.

Third, **beta may not remain constant over time**. Changes in a company's financial structure, business environment, market conditions or economic cycle may affect its systematic-risk exposure. Therefore, a beta calculated for a particular period may not necessarily represent the risk exposure of the same asset in another period.

Fourth, differences in the **methodologies used by the underlying studies** may affect comparability. Different researchers may use different market benchmarks, return frequencies, sample periods, factor definitions and estimation procedures.

Fifth, the availability of information is not uniform across all observations. Some entries in the research material contain information that is not available from the original source. Such observations are not supplemented through assumptions or estimated values. Where information is identified as **"Not in source,"** it is treated as unavailable.

Sixth, the study considers a wide range of asset classes, but the **risk factors relevant to one asset class may not be equally relevant to another**. For example, factors that explain conventional equity returns may not fully capture the risk characteristics of cryptocurrencies, real estate or renewable-energy investments.

Seventh, the study is primarily **comparative and analytical**, meaning that differences observed between models or markets should not automatically be interpreted as evidence of direct causality.

Finally, although multifactor models provide a broader framework than traditional CAPM, **adding more factors does not automatically make a model superior**. Model complexity, data availability and economic interpretation must also be considered when evaluating the usefulness of alternative asset-pricing approaches.

Despite these limitations, the study provides a structured basis for comparing CAPM and multifactor approaches and for understanding how systematic risk and expected returns may differ across markets, asset classes and investment environments.

CONCEPTUAL FRAMEWORK

The conceptual framework of the study explains the relationship between **systematic risk, beta, additional risk factors and expected returns**. The framework is primarily based on the Capital Asset Pricing Model (CAPM), while also incorporating the broader factors considered in multifactor asset-pricing models.

The central idea is that an investor's expected return is influenced by the level and nature of systematic risk associated with an investment. In the traditional CAPM framework, **beta** represents the sensitivity of an asset to movements in the overall market. However, the development of multifactor models suggests that other systematic factors may also contribute to differences in expected returns.

Key Variables in the Framework

Independent / Explanatory Variables

The major explanatory variables considered in the study are:

1. Market Risk

Market risk represents the risk arising from movements in the overall financial market. It is captured through the market excess return in CAPM and multifactor models.

2. Beta

Beta measures the sensitivity of an asset's return to changes in the market. A higher beta indicates greater exposure to systematic market movements.

3. Size

Size represents differences between smaller and larger firms. In multifactor models, the size factor captures differences in returns associated with firm size.

4. Value

Value represents differences between firms with relatively high and low valuation characteristics. It is commonly represented through the value factor.

5. Profitability

Profitability represents differences in firms' ability to generate profits. The factor is included in the Fama-French five-factor framework.

6. Investment

Investment represents differences in firms' investment behaviour. Firms with different investment patterns may have different return characteristics.

7. Momentum

Momentum represents the tendency of securities that have performed relatively well or poorly in the past to exhibit different subsequent return patterns.

8. Liquidity

Liquidity represents the ease with which an asset can be bought or sold without substantially affecting its price. Where relevant, liquidity is considered as an additional source of systematic risk.

9. ESG / Climate Risk

Where supported by the available research material, ESG and climate-related factors are considered as emerging dimensions of systematic risk that may influence expected returns.

Mediating Concept

Systematic Risk Exposure acts as the central connecting concept within the framework.

The explanatory variables influence the level or nature of an asset's exposure to systematic risk. This systematic-risk exposure is then reflected in expected or realized returns.

Dependent Variable

The primary dependent variable is:

Expected / Realized Return

Expected return represents the return anticipated for a given level of risk, while realized return represents the return actually observed during the relevant investment period.

Conceptual Relationship

The framework can be represented as:

```
        MARKET RISK
            |
            ▼
           BETA
            |
            ▼
  SYSTEMATIC RISK EXPOSURE
            |
            ▼
   EXPECTED / REALIZED
          RETURN
```

The broader multifactor framework is represented as:

```
┌──────────────────────────┐
│   MARKET RISK     │
└────────────┬─────────────┘
     │
┌────────────▼─────────────┐
│    BETA      │
```

ADDITIONAL RISK FACTORS

SIZE VALUE PROFITABILITY

INVESTMENT MOMENTUM LIQUIDITY

ESG / CLIMATE RISK (where applicable)

SYSTEMATIC RISK
EXPOSURE

EXPECTED / REALIZED
RETURN

Model-Based Conceptual Framework

The relationship between the asset-pricing models and the variables can be represented as follows:

ASSET-PRICING MODELS

CAPM FF3F Carhart / FF5F

▼ ▼ ▼

Market Risk + Beta | Market + Size + Value | Multiple Risk Factors

▼

SYSTEMATIC RISK EXPOSURE

▼

EXPECTED / REALIZED RETURN

Figure 1 Relationship between Asset-pricing and the variables

Source: Author's own creation

Explanation of the Framework

The conceptual framework proposes that **market risk and beta form the foundation of the relationship between risk and return**. In the CAPM framework, greater systematic market exposure is expected to be associated with higher required returns.

The multifactor perspective extends this relationship by recognising that securities may have exposure to several systematic factors simultaneously. Size, value, profitability, investment and momentum may therefore provide additional information about differences in returns. Liquidity and ESG or climate-related risks may also become relevant depending on the asset, market and research context.

The framework therefore does not assume that every factor affects every asset in the same manner. Instead, it recognises that the relevance of a particular risk factor depends on the characteristics of the investment and the asset-pricing model being examined.

The overall conceptual relationship can be summarised as:

Asset-Pricing Model → Risk Factors → Systematic Risk Exposure → Expected / Realized Return

The framework provides the basis for comparing CAPM with multifactor models and examining whether additional systematic-risk factors provide explanatory information beyond traditional market beta.

RESEARCH METHODOLOGY

Research Design

The study follows a **descriptive, analytical and comparative research design**. It focuses on understanding how systematic risk and beta are related to expected returns and examines whether multifactor models provide additional insights beyond the traditional CAPM framework.

Research Approach

The study is primarily based on **secondary data**. Existing firm-, portfolio- and asset-level information is examined to identify patterns in risk and returns across different markets and asset classes. The study also uses existing academic literature to provide the theoretical foundation for comparing different asset-pricing models.

Data Sources

The research uses the available compiled dataset and academic literature covering **beta, expected returns, Jensen's alpha and systematic-risk factors**. The data represent different investments and markets, including equities, funds, renewable energy, sustainable portfolios, cryptocurrencies, real estate and other assets.

Unit of Analysis

The unit of analysis varies according to the available data and includes **individual firms, stocks, portfolios, funds and other investment assets**. Since the observations come from different markets and asset classes, they are considered within their respective contexts.

Variables of the Study

Table 1 Variables of the Study

Source: Author's Own tabulation

Variable	**Type**	**Measurement / Proxy**
Expected / Realized Return	Dependent	Reported return

Variable	Type	Measurement / Proxy
Beta	Independent	Sensitivity to market movements
Market Risk	Independent	Market excess return
Size	Independent	SMB factor
Value	Independent	HML factor
Profitability	Independent	RMW factor
Investment	Independent	CMA factor
Momentum	Independent	Momentum factor
Liquidity	Independent	Liquidity measure, where available
Jensen's Alpha	Performance Measure	Risk-adjusted return

The variables included in the analysis depend on the model being examined and the information available in the dataset.

Models Used

The **Capital Asset Pricing Model (CAPM)** is used as the basic benchmark for understanding the relationship between market risk and expected return:

$$\mathbf{E(R_i) = Rf + \beta_i[E(Rm) - Rf]}$$

The study also considers selected multifactor models, including the **Fama-French Three-Factor Model, Carhart Four-Factor Model and Fama-French Five-Factor Model**. These models allow the study to examine whether factors such as size, value, momentum, profitability and investment provide additional information about returns.

Jensen's Alpha

Jensen's alpha is considered to assess whether an investment generated a return above or below the return expected from the relevant asset-pricing model. It provides an additional perspective on the risk-adjusted performance of the investments included in the study.

Data Analysis

The available data are examined using **descriptive and comparative analysis**. The study compares beta, returns, Jensen's alpha and relevant risk factors across different markets, assets and models. Where sufficient and compatible numerical observations are available, correlation or regression analysis may also be considered.

Treatment of Missing Data

The study does not assume or create values that are unavailable in the original sources. Observations marked **"Not in source"** are retained as unavailable. Differences in data periods, markets, asset classes and methodologies are also considered when interpreting the results.

Overall, the methodology is designed to provide a practical comparison of traditional and multifactor approaches to asset pricing while keeping the analysis closely aligned with the information available in the research material.

CONCLUSION

The study highlights the continuing importance of understanding the relationship between **risk and return** in financial markets. The Capital Asset Pricing Model provides a simple and useful starting point by linking expected return to systematic market risk through beta. However, the literature and evidence considered in this study indicate that beta alone may not always provide a complete explanation of differences in asset returns.

The development of multifactor models has expanded the understanding of systematic risk by considering additional factors such as **size, value, profitability, investment and momentum**. These models provide a broader perspective and may offer additional insights into return behaviour that are not captured by traditional CAPM.

An important observation from the study is that **no single asset-pricing model can necessarily be considered universally applicable**. The relevance of different risk factors can vary across markets, asset classes and investment periods. This is particularly important when comparing developed and emerging markets or traditional investments with newer asset classes such as sustainable investments, renewable energy and cryptocurrencies.

The study also highlights the importance of viewing beta as an important but potentially changing measure of systematic risk. Investors and financial analysts therefore need to consider the broader risk characteristics of an investment rather than relying exclusively on historical beta.

Overall, CAPM remains a valuable benchmark because of its simplicity and practical usefulness, while multifactor models provide a more detailed approach to understanding return differences. The comparison of these approaches suggests that effective investment analysis requires a **context-specific understanding of systematic risk**. For investors, portfolio managers and financial decision-makers, considering multiple sources of risk can lead to a more informed assessment of expected returns and investment performance.

RECOMMENDATIONS AND FUTURE SCOPE

Recommendations

Based on the study, the following recommendations can be made:

1. **Use CAPM as a starting point, not the only measure of risk.** Investors can use beta and CAPM as a basic benchmark but should consider additional risk factors when evaluating investments.
2. **Consider multiple risk factors.** Factors such as size, value, profitability, investment and momentum can provide a broader understanding of return behaviour where relevant data are available.
3. **Adopt a market-specific approach.** Investors should avoid assuming that the same asset-pricing model will perform equally well across developed and emerging markets. Market structure and economic conditions should be considered when selecting a model.
4. **Consider the characteristics of the asset class.** Different investments may be exposed to different sources of systematic risk. Therefore, the model used for traditional equities may not be equally appropriate for cryptocurrencies, real estate, renewable energy or sustainable portfolios.
5. **Monitor beta over time.** Since an asset's market sensitivity can change, investors should avoid relying on a single historical beta and should review risk exposure periodically.

6. **Use risk-adjusted performance measures.** Measures such as Jensen's alpha can complement expected-return analysis by showing whether an investment has performed above or below the return expected for its level of risk.

Future Scope of the Study

The study provides several opportunities for future research.

First, future studies can use **larger and more consistent datasets** covering longer periods and a greater number of firms and portfolios. This would allow stronger comparisons between CAPM and multifactor models.

Second, future research can conduct **formal statistical testing**, including regression analysis, significance testing and model-comparison techniques, to quantitatively evaluate the explanatory power of different asset-pricing models.

Third, future studies can examine **time-varying beta** to determine whether systematic risk changes significantly across different market conditions and economic cycles.

Fourth, researchers can focus specifically on **Indian financial markets** and compare CAPM with Fama-French and other multifactor models across different sectors, market-capitalisation groups and investment periods.

Fifth, future research can give greater attention to **ESG, climate risk and sustainable investing** as emerging sources of systematic risk. This may help determine whether sustainability-related factors provide information beyond traditional financial risk factors.

Finally, future studies can explore asset-pricing models across **alternative asset classes**, including cryptocurrencies, renewable energy, real estate and other emerging investments. Such research could provide a better understanding of whether traditional risk factors remain relevant as financial markets and investment products continue to evolve.

Overall, future research should move toward more **dynamic, market-specific and asset-specific approaches to asset pricing**, rather than assuming that a single model can explain the behaviour of all investments.

REFERENCES

Abraham, R., El-Chaarani, H., & Tao, Z. (2022). Predictors of Excess Return in a Green Energy Equity Portfolio: Market Risk, Market Return, Value-at-Risk and or Expected Shortfall? Journal of Risk and Financial Management, 15(2). https://doi.org/10.3390/jrfm15020080

Alonso-Conde, A. B., & Rojo-Suáreza, J. (2022). Trends in the explanatory power of factor-based asset pricing models in determining the cost of capital. Cuadernos de Gestion, 22(1), 51–63. https://doi.org/10.5295/CDG.211521AA

Anastasiadis, P., Katsaros, E., Koutsioukis, A. T., &Pandazis, A. (2020). Performance- Risk Nexus of Global Low-Rated ETFs during the QE-Tapering Period. Studies in Business and Economics, 15(1), 194–211. https://doi.org/10.2478/sbe-2020-0015

Angelini, P. (2024). Extended Least Squares Making Evident Nonlinear Relationships between Variables: Portfolios of Financial Assets. Journal of Risk and Financial Management, 17(8). https://doi.org/10.3390/jrfm17080336

Blatter, A. B., Ernst, D., & Lang, S. M. (2025). Diversification in Business Valuation. Journal of Business Valuation and Economic Loss Analysis, 20(1), 1–28. https://doi.org/10.1515/jbvela-2024-0024

Brusov, P. N., Filatova, T. v., & Kulik, V. L. (2024). Capital Asset Pricing Model (CAPM) 2.0: Account of Business and Financial Risk. Finance: Theory and Practice, 28(2), 128– 142. https://doi.org/10.26794/2587-5671-2024-28-2-128-142

Cesarone, F., di Paolo, A., Bufalo, M., & Orlando, G. (2025). A benchmark-asset principal component factorization for index tracking on large investment universes. Finance Research Letters, 79. https://doi.org/10.1016/j.frl.2025.107244

Chaderina, M., Weiss, P., &Zechner, J. (2022). The maturity premium. Journal of Financial Economics, 144(2), 670–694. https://doi.org/10.1016/j.jfineco.2021.07.008

Cheng, Y. (2025). Monte Carlo-Based VaR Estimation and Backtesting Under Basel III. Risks, 13(8). https://doi.org/10.3390/risks13080146

Claassen, B., Dam, L., &Heijnen, P. (2023). Corporate financing policies, financial leverage, and stock returns. North American Journal of Economics and Finance, 68. https://doi.org/10.1016/j.najef.2023.101992

Ewald, C. O., & Taub, B. (2022). Real options, risk aversion and markets: A corporate finance perspective. Journal of Corporate Finance, 72. https://doi.org/10.1016/j.jcorpfin.2022.102164

Feder-Sempach, E., &Szczepocki, P. (2022). The Bayesian Method in Estimating Polish and German Industry Betas. A Comparative Analysis of the Risk between the Main Economic Sectors from 2001-2020. Comparative Economic Research, 25(2), 45– 60. https://doi.org/10.18778/1508-2008.25.12

Fehrle, D., & Heiberger, C. (2024). The return on everything and the business cycle in production economies ☆. https://doi.org/10.17632/mw9

Gaibie, T., Sebastian, A., & Merino, A. (2024). An evaluation of the use of professional judgement in corporate valuations in South Africa. South African Journal of Business Management, 55(1). https://doi.org/10.4102/sajbm.v55i1.3878

Habis, H. (2024). Procrastination and intertemporal consumption: A three-period extension of the CAPM with irrational agents. Finance Research Letters, 63. https:// doi.org/10.1016/j.frl.2024.105325

Halim, A. bin A., &Sukor, M. E. bin A. (2025). Asset pricing anomalies: The case of dividends in the US for Sharia-compliant firms. Borsa Istanbul Review, 25(2), 253–264. https://doi.org/10.1016/j.bir.2025.01.009

Hamdan, M., Calavia, P. F., & Aminu, N. (2024). Wealth and familiarity bias: sin stocks investment in Europe. Journal of Asset Management, 25(7), 714–725. https://doi.org/10.1057/s41260-024-00360-5

Hasan, I., Singh, S., &Kashiramka, S. (2025). Exploring the financial performance of ESG investing in India: evidence using asset-pricing models. China Accounting and Finance Review, 27(3), 421–466. https://doi.org/10.1108/CAFR-12-2023-0153

Hearn, B., Filatotchev, I., & Goergen, M. (2025). Dispersed ownership and asset pricing: An unpriced premium associated with free float. Journal of Corporate Finance, 92. https://doi.org/10.1016/j.jcorpfin.2025.102763

Hearn, B., Tauringana, V., Ntim, C., Malagila, J. K., & Mishra, T. (2025). Asset pricing in African frontier equity markets. International Review of Financial Analysis, 97. https:// doi.org/10.1016/j.irfa.2024.103752

Ismail, A. M., Ismail, C. R., Sulaiman, S., & Daud, D. (2020). Corporate governance and firm risk: evidence from malaysian shariah compliance companies. Humanities and Social Sciences Letters, 8(2), 169–193. https://doi.org/10.18488/JOURNAL.73.2020.82.169.193

Khoa, B. T., & Huynh, T. T. (2023). A COMPARISON OF CAPM AND FAMA-FRENCH THREE-FACTOR MODEL UNDER MACHINE LEARNING APPROACHING. Journal of Eastern European and Central Asian Research, 10(7), 1100–1111. https://doi.org/10.15549/jeecar.v10i7.1402

Kovalev, V. v., &Drachevsky, I. S. (2020). Dividend policy as a factor for managing company value: Comparing trends in emerging markets. Vestnik Sankt-PeterburgskogoUniversiteta. Ekonomika, 36(1), 95–116. https://doi.org/10.21638/spbu05.2020.105

Lizarzaburu Bolaños, E., Burneo Farfán, K., & García-Gómez, C. D. (2023). Economic- financial evaluation of a cement company: CementosPacasmayo. Revista Academia and Negocios, 9(1), 65–78. https://doi.org/10.29393/RAN9-6EFEC30006

Maio, P. (2026). Recursive utility under the ICAPM: Is it relevant? Economics Letters, 258. https://doi.org/10.1016/j.econlet.2025.112724

Marios, A., Kalliopi, D., Evangelia, P., & Paraskevi, P. (2020). Performance Evaluation of Global High-rated ETFs during the Taper Tantrum. Journal of Central Banking Theory and Practice, 9(1), 23–44. https://doi.org/10.2478/jcbtp-2020-0002

Markowski, L. (2024). Conventional and downside CAPM with higher-order moments: Evidence from emerging markets. Equilibrium. Quarterly Journal of Economics and Economic Policy, 19(1), 93–138. https://doi.org/10.24136/eq.2043

Neslihanoglu, S. (2021). Linearity extensions of the market model: a case of the top 10 cryptocurrency prices during the pre-COVID-19 and COVID-19 periods. Financial Innovation, 7(1). https://doi.org/10.1186/s40854-021-00247-z

Pramono, P. E. S., Rudianto, D., Siboro, F., Abdul Baqi, M. P., &Julianingsih, D. (2022). Analysis Investor Index Indonesia with Capital Asset Pricing Model (CAPM). APTISI Transactions on Technopreneurship, 4(1), 35–46. https://doi.org/10.34306/att.v4i1.218

Qadeer, A., de Moor, L., & Ahmad, A. (2023). Asset pricing dynamics in sustainable equity portfolios: Evidence from the Pakistan Stock Exchange. Economic Research- EkonomskaIstrazivanja , 36(3). https://doi.org/10.1080/1331677X.2022.2147977

Quaye, E., Tunaru, D., &Tunaru, R. (2024). Green-adjusted share prices: A comparison between standard investors and investors with green preferences. Journal of Financial Stability, 74. https://doi.org/10.1016/j.jfs.2024.101314 Reyes-Clavijo, M. A., Pinos-Luzuriaga, L. G., Orellana-Osorio, I. F., & Tonon-Ordóñez,

L. B. (2023). Capital Asset Pricing Model (CAPM) applied to the corporate sector of Ecuador. Retos(Ecuador), 13(25), 111–124. https://doi.org/10.17163/ret.n25.2023.08

Rutkowska – Ziarko, A., Markowski, L., & Abdou, H. A. (2024). Conditional CAPM relationships in standard and accounting risk approaches. North American Journal of Economics and Finance, 72. https://doi.org/10.1016/j.najef.2024.102123

Saculsan, P. G., &Kanamura, T. (2020). Examining risk and return profiles of renewable energy investment in developing countries: the case of the Philippines. Green Finance, 2(2), 135–150. https://doi.org/10.3934/GF.2020008

Salameh, H. M. (2020). Application of asset pricing models: Evidence from Saudi exchange. Investment Management and Financial Innovations, 17(1), 348–368. https:// doi.org/https:// doi.org/10.21511/imfi.17(1).2020.29

Sharma, B., & Srikanth, P. (2021). Research & development premium in the Indian equity market: An empirical study. Asian Economic and Financial Review, 11(10), 816– 828. https://doi.org/10.18488/JOURNAL.AEFR.2021.1110.816.828

Sharma, B., Srikanth, P., & Suresha, B. (2022). Size, Value Effects and the Explanatory Power of Pricing Models: Evidence from BSE listed Indian Industries. Scientific Papers of the University of Pardubice, Series D: Faculty of Economics and Administration, 30(2). https://doi.org/10.46585/sp30021490

Shetty, S., Dsouza, J. J., & Hawaldar, I. T. (2021). Rolling regression technique and cross-sectional regression: A tool to analyze Capital Asset Pricing Model. Investment Management and Financial Innovations, 18(4), 241–251. https://doi.org/10.21511/ IMFI.18(4).2021.21

Steffen, B. (2020). Estimating the cost of capital for renewable energy projects. Energy Economics, 88. https://doi.org/10.1016/j.eneco.2020.104783

Treepongkaruna, S., Chan, K. F., & Malik, I. (2023). Climate policy uncertainty and the cross-section of stock returns. Finance Research Letters, 55. https://doi.org/10.1016/ j.frl.2023.103837

Vendrame, V., Guermat, C., & Tucker, J. (2023). A conditional higher-moment CAPM. International Review of Financial Analysis, 86. https://doi.org/10.1016/j.irfa.2023.102524

Vinodkumar, N., &AlJasser, H. K. (2020). Financial evaluation of Tadawul All Share Index (TASI) listed stocks using Capital Asset Pricing Model. Investment Management and Financial Innovations, 17(2), 69–75. https://doi.org/10.21511/imfi.17(2).2020.06

Vo, X. V., Vo, V. P., & Nguyen, T. P. (2020). Abnormal returns and idiosyncratic volatility puzzle: An empirical investigation in Vietnam stock market. Cogent Economics and Finance, 8(1). https://doi.org/10.1080/23322039.2020.1735196

Widianingsih, Y. P. N., Setiawan, D., Aryani, Y. A., &Gantyowati, E. (2022). Accrual Management and Firm-Specific Risk. International Journal of Financial Studies, 10(4). https://doi.org/10.3390/ijfs10040111

Zhang, A., Pan, M., & Zhang, X. (2025). The pricing ability of factor model based on machine learning: Evidence from high-frequency data in China. International Review of Economics and Finance, 101. https://doi.org/10.1016/j.iref.2025.104153

Zhou, J. (2025). Forecasting Beta Using Ultra High Frequency Data. Journal of Forecasting, 44(2), 485–496. https://doi.org/10.1002/for.3204

ZOZULYA, V., SOKOLOV, E., KOSTYRIN, E., & KOROLEV, S. (2021). The effectiveness of applying beta-coefficient modifications when calculating returns on shares in Russian companies. Eastern Journal of European Studies, 12(1), 31–52.