DOI: https://doi.org/10.4038/ijabf.v12i1.206

International Journal of Accounting & Business Finance
Vol.12, No.1, June 2026 Issue. pp: 405-422

DOES THE FAMA–FRENCH FIVE-FACTOR MODEL EXPLAIN EXCESS RETURNS? EVIDENCE FROM NON-FINANCIAL FIRMS IN SRI LANKA

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Received: 04 January 2026 Revised: 20 June 2026 Accepted: 28 June 2026

Abstract

This study examines whether the Fama–French Five-Factor model explains variation in expected excess returns of non-financial firms listed on the Colombo Stock Exchange (CSE) in Sri Lanka. The primary objective is to determine whether the five risk factor proxies: market risk premium, size, value, profitability, and investment significantly explain variations in the excess returns. The sample consists of 80 non-financial firms observed over the period 2020–2024. Quarterly data were obtained from company financial reports and the Colombo Stock Exchange (CSE). The dependent variable is excess return, while the independent variables are market risk premium, size, value, profitability, and investment factor. Descriptive statistics show negative mean, maximum, and minimum values for both excess returns and market risk premiums during the study period, reflecting adverse market conditions caused by the COVID-19 pandemic and Sri Lanka's economic crisis. This highlights increased market volatility and reduced investor confidence. The panel dataset was analyzed using econometric techniques, including descriptive statistics, correlation analysis, and panel regression modeling. The Hausman test was used to determine the appropriate model specification, confirming that the Fixed Effects model is the most suitable for addressing unobserved heterogeneity. The model explains 58.64% of the variation in excess returns, indicating considerable explanatory power. The market risk premium and size factors have a statistically significant positive effect on excess returns, while value, profitability, and investment factor do not show statistically significant relationships. This suggests that these characteristics may be underpriced in the CSE. The findings indicate that market beta and firm size are key determinants in equity portfolio strategies. Policymakers are encouraged to strengthen corporate transparency and disclosure practices to improve market efficiency and ensure that stock prices more accurately reflect firms' underlying fundamentals. Overall, the study demonstrates the partial applicability of the Fama–French Five-Factor model in Sri Lanka's emerging market and suggests future research directions, such as incorporating liquidity risk and macroeconomic variables to further enhance asset pricing models.

Keywords: Fama-French Five-Factor Model, Excess Returns, Colombo Stock Exchange, Fixed Effects Model, Market Risk Premium, Non-Financial Firms, Emerging Markets, Sri Lanka

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1. Introduction

Asset pricing has long been a central pillar of modern finance because it seeks to explain why securities generate different returns and how investors are compensated for bearing risk. The pioneering work of Markowitz (1952) established the foundation of modern portfolio theory by demonstrating that investment decisions should consider both expected return and risk. Building on this framework, the Capital Asset Pricing Model (CAPM) proposed that systematic market risk, measured by beta, is the sole determinant of expected excess returns (Sharpe, 1964; Lintner, 1965; Mossin, 1966). Although CAPM provides an elegant theoretical framework, subsequent empirical evidence has shown that market beta alone cannot fully explain the cross-sectional variation in stock returns. In particular, anomalies such as the size and value effects challenge the assumption that systematic market risk is the only determinant of expected returns (Banz, 1981; Basu, 1983). These limitations motivated the development of multifactor asset pricing models that better capture observed return patterns. Among these models, the Fama–French Three-Factor Model is one of the most influential extensions of CAPM. Fama and French (1993) demonstrated that adding size and value factors significantly improves the model's explanatory power. Later, Carhart (1997) introduced a momentum factor, further showing that stock returns are influenced by multiple systematic risk factors. More recently, Fama and French (2015) developed the Five-Factor Model (FF5FM), which adds profitability and investment factors to the traditional market, size, and value factors. The model assumes that firms with higher profitability and more conservative investment policies should, all else equal, generate different expected returns than less profitable or more aggressively investing firms. Evidence from developed markets, particularly the United States, suggests that the FF5FM provides superior explanatory power and lower pricing errors compared to earlier models (Fama & French, 2015). However, the applicability of the FF5FM cannot be assumed in emerging and frontier markets. Differences in market structure, liquidity, trading activity, disclosure quality, ownership concentration, and macroeconomic stability may influence how risk factors are priced. These challenges are particularly relevant in frontier markets such as Sri Lanka, where thin trading, limited analyst coverage, information asymmetry, and institutional constraints may weaken the assumptions underlying traditional asset pricing models. Consequently, the Colombo Stock Exchange (CSE) provides an important setting to examine whether the FF5FM adequately

explains stock returns outside developed markets. As noted by Foye (2018), factor premiums vary across countries and time, indicating that the model's explanatory power is highly context dependent. Empirical evidence from Sri Lanka remains limited and mixed. Earlier studies generally supported the applicability of CAPM and multifactor models, although results vary across samples and methodologies. Several studies report significant size and value effects in the Sri Lankan market, suggesting that multifactor models outperform CAPM in explaining returns (Randeniya & Wijerathna, 2017; Madhuranthagan & Shantha, 2021). Other research highlights the role of additional factors such as momentum, though their significance is not consistent across periods (Abeysekera & Nimal, 2017). More recent studies on the FF5FM also produce mixed findings, with some identifying only partial factor significance and others reporting improved explanatory power but unstable coefficients (Thafani & Ediriwickrama, 2022; Perera, 2022; Suganya et al., 2025). Overall, these inconsistencies raise an important question regarding the ability of the FF5FM to explain excess returns in the Sri Lankan stock market. This issue has become more important following Sri Lanka's recent economic crisis. The 2022 sovereign debt crisis, combined with severe currency depreciation, high inflation, and financial market instability, significantly affected firm profitability, investment decisions, and investor expectations. These conditions may have altered the relevance of profitability and investment factors, which are key innovations of the FF5FM. However, much of the existing empirical evidence is based on pre-crisis data, limiting its relevance to current market conditions. In addition, many studies combine financial and non-financial firms, despite their differences in regulatory environment, capital structure, leverage, and reporting practices. Such differences may distort factor construction and affect empirical validity. Although the FF5FM has been studied in Sri Lanka, limited research has examined its ability to explain excess returns using a focused sample of non-financial firms during the post-crisis period. Addressing this gap is important both theoretically and practically. Theoretically, it contributes to assessing the cross-market validity of a leading asset pricing model in a frontier market context. Practically, investors, portfolio managers, and regulators require updated evidence that reflects current market conditions. If certain factors are not consistently priced in the CSE, investment strategies based on the FF5FM may lead to misleading conclusions. Accordingly, this study examines whether the Fama–French Five-Factor Model explains variations in the excess returns of non-financial firms listed on the Colombo Stock Exchange during the post-crisis period. The study

provides updated evidence on the applicability of the FF5FM in a frontier market characterised by structural constraints and macroeconomic volatility by focusing on the 2020–2024 period. The findings contribute to the asset pricing literature by extending frontier market evidence and offering practical insights into the relevance of the five risk factors for investment decision-making in Sri Lanka.

2. Literature Review

2.1 Theoretical Framework

The evolution of asset pricing theories has progressed from simple single-factor models to more complex multi-factor specifications, driven by persistent empirical anomalies and limitations in earlier frameworks. These unresolved shortcomings have motivated the development of more sophisticated factor-based asset pricing models.

2.1.1 Sharpe's Single Index Model

Sharpe's Single Index Model conceptualizes a security's return as a linear function of market return and an idiosyncratic error term, with beta measuring sensitivity to systematic market movements (Sharpe, 1964). Its analytical simplicity and intuitive appeal make it useful for portfolio construction and for isolating market-driven risk. However, the model's restrictive assumptions: homogeneous expectations, a single-period horizon, uncorrelated disturbance terms, and exclusive reliance on market volatility limit its explanatory power in empirical contexts where cross-sectional return heterogeneity exists.

2.1.2 Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM), developed by Sharpe (1964), Lintner (1965), and Mossin (1966), explains the risk–return relationship in financial markets. Its core assumptions include rational mean–variance optimization by investors, frictionless markets, homogeneous expectations of returns, and unrestricted borrowing and lending at a risk-free rate.

The CAPM predicts that only systematic risk, represented by beta (β), is priced in the market and establishes a linear relationship between beta and expected return, with the market portfolio lying on the efficient frontier. However, empirical anomalies such as the size effect (Banz, 1981), value effect (Rosenberg et al., 1985), and momentum effect (Jegadeesh & Titman, 1993) challenge the validity of the CAPM, as beta alone fails to explain these return patterns.

2.1.3 Consumption-Based Capital Asset Pricing Model (CCAPM)

The Consumption-Based Capital Asset Pricing Model (CCAPM), introduced by Lucas Jr. (1978) and Breeden (1979), extends asset pricing theory by linking expected returns to consumption risk. Unlike the static, single-period CAPM, the CCAPM adopts a multi-period intertemporal framework.

Its central implication is that expected asset returns are determined by their covariance with aggregate consumption growth. Assets that perform poorly when consumption is low require higher expected returns as compensation for risk. The CAPM can be derived as a special case of the CCAPM under specific utility functions and simplifying assumptions.

2.1.4 Intertemporal Capital Asset Pricing Model (ICAPM)

The Intertemporal Capital Asset Pricing Model (ICAPM), developed by Merton (1973), extends the CAPM by incorporating multiple time periods and changes in investment opportunities over time. The model introduces state variables such as inflation, interest rates, and labour income growth as additional sources of systematic risk.

The ICAPM implies that investors demand hedging assets that provide favourable returns when future investment opportunities deteriorate. However, the model faces practical challenges, including mathematical complexity and difficulties in identifying and empirically measuring relevant state variables.

2.1.5 Arbitrage Pricing Theory (APT)

Arbitrage Pricing Theory (APT), developed by Ross (1976), provides a flexible multi-factor framework in which an asset's expected return is expressed as a linear function of multiple systematic macroeconomic or market factors, plus a diversifiable idiosyncratic component.

The model is based on key assumptions of no arbitrage, frictionless markets, rational investors, and fully diversifiable firm-specific risk. While these assumptions facilitate theoretical derivation, they are often violated in practice due to transaction costs, short-selling constraints, and time-varying betas, which can limit arbitrage effectiveness and reduce the stability of estimated factor sensitivities.

2.1.6 Fama–French Three-Factor Model

The Fama–French Three-Factor Model (FF3FM), introduced by Fama and French (1993), extended CAPM by incorporating two additional factors: Small Minus Big (SMB) and High Minus Low (HML). This framework was motivated by empirical anomalies such as the size effect (Banz, 1981) and the book-to-market effect (Stattman, 1980).

The model improves the explanation of cross-sectional stock returns by adding size and value premiums to market risk (MKT). Their later work (Fama & French, 1995) provided further support for these factors as proxies for systematic risk.

Model form:

$E(Ri)-Rf=\beta i(E(Rm-Rf)) + siSMB+ hiHML$

such as profitability and investment effects, motivating further extensions.

2.1.7 Carhart Four-Factor Model

Carhart (1997) extended the FF3FM by adding a momentum factor (MOM), improving the model's ability to capture return persistence patterns in stock returns.

The model assumes that market risk, size, value, and momentum jointly explain expected returns. However, it still faces limitations, including its restrictive linearity assumption and omission of other potential determinants such as liquidity and profitability. Moreover, the relationship between firm characteristics (e.g., size and returns) may be nonlinear rather than strictly linear.

2.1.8 Fama–French Five-Factor Model

Fama and French (2015) extended their three-factor model by adding profitability (RMW) and investment (CMA) factors. This expanded framework improves explanatory power by incorporating firm operating performance and investment behavior.

Empirical evidence by Novy-Marx (2013) shows that profitability is strongly related to average returns, while Titman et al. (2004) demonstrate that firms with conservative investment policies tend to earn higher returns than aggressively investing firms, suggesting that overinvestment destroys value. These findings motivated the inclusion of profitability and investment factors in asset pricing models, resulting in a more comprehensive framework.

2.2 Empirical Review

The Fama–French Five-Factor Model (FF5FM), introduced by Fama and French (2015), extends the earlier three-factor model by incorporating profitability (RMW) and investment (CMA), in addition to market (MKT), size (SMB), and value (HML) factors. However, empirical evidence on the model remains mixed, particularly in emerging and frontier markets, where institutional conditions and market efficiency vary significantly.

Chiah (2016) found that the FF5FM generally outperforms competing models in explaining asset pricing anomalies across international markets. However, the book-to-market factor retained explanatory power even after including profitability and investment factors, contrary to the findings of Fama and French (2015). The results were robust across alternative factor definitions and portfolio constructions, providing strong out-of-sample support for the model.

Foye (2018), examining 18 emerging markets, found that the FF5FM performed well in Eastern Europe and Latin America but failed to improve explanatory power in Asian markets due to insignificant profitability and investment premiums.

Cox and Britten (2019), using data from the Johannesburg Stock Exchange, found that a three-factor model incorporating size, value, and profitability outperformed the five-factor model over time, suggesting limited incremental value from the investment factor in South Africa. In contrast, Acaravci and Karaomer (2017) found that the FF5FM adequately priced returns in the Borsa Istanbul, with no significant pricing errors under the GRS test.

In Sri Lanka, empirical evidence remains limited and mixed. Studies on the Colombo Stock Exchange (CSE) show inconsistent support for asset pricing models. Manikrama and Udaya Kumara (2021) found that market risk is significant under both CAPM and FF3FM, while size and value factors are insignificant, although FF3FM performs better overall.

Randeniya and Wijerathna (2012) argued that CAPM is insufficient and that multi-factor models better explain stock returns. Similarly, Rathnasekara (2017) found that anomalies such as the price–earnings effect weaken CAPM validity in Sri Lanka, while Riyath and Nimal (2016) confirmed the superiority of multi-factor models over CAPM.

Nanayakkara (2008) reported significant size and value effects in explaining returns on the CSE, supporting the FF3FM. Seneviratne and Nimal (2008) also found strong evidence for size and book-to-market effects. Further studies (e.g., Madhuranthagan, 2021; Riyath, 2016) consistently show FF3FM superiority over CAPM.

Extensions incorporating momentum (Carhart, 1997) have also been tested. Abeysekara and Nimal (2017) and Riyath and Nimal (2016) found that momentum significantly improves explanatory power in Sri Lanka.

Evidence on the FF5FM is still emerging and remains inconclusive. Thafani and Ediriwickrama (2022) found mixed results, where MKT and HML were significant, but SMB, RMW, and CMA were generally insignificant. They also suggested that local risk factors such as illiquidity and political uncertainty may not be captured by the model.

Perera (2022) highlighted that high idiosyncratic risk reduces the model's reliability in Sri Lanka, affecting its usefulness for cost of equity estimation. More recently, Suganya et al. (2025) found that while FF5FM outperforms CAPM, SMB and HML showed negative effects on returns, indicating model instability in the local market.

Based on the theoretical and empirical review, following conceptual frame work and hypotheses have been formulated to conduct the study.

The conceptual framework of this research illustrates the relationship between the variables, grounded in the Fama-French Five-Factor Model developed by Fama and French (2015). This model extends the traditional Capital Asset Pricing Model (CAPM) by incorporating five risk factors such as market risk premium, size, value, profitability, and investment to explain variations in excess returns. This framework provides a structured approach to assess the applicability of the Fama-French Five-Factor Model in the context of the Sri Lankan emerging market based on the proxies used in the study. The factor proxies representing market risk premium, size, value, profitability and investment.

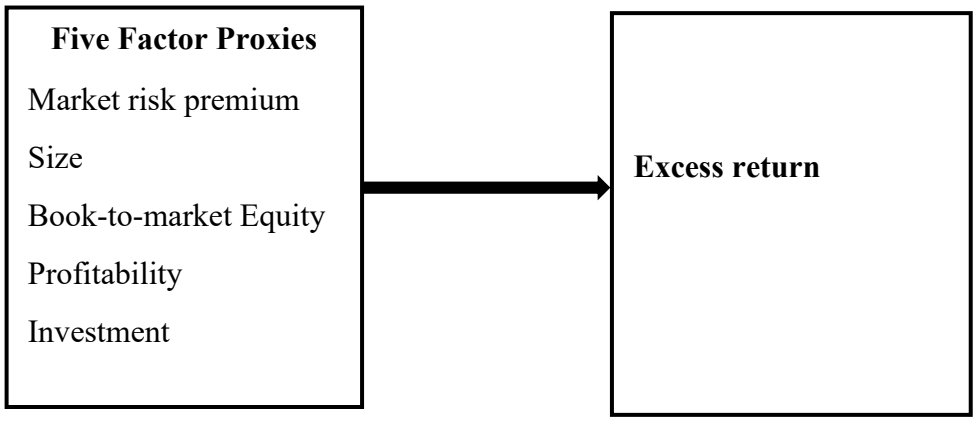


Figure 1. Conceptual framework

Hypotheses

H1: The Fama–French Five-Factor Model explains the variation in the excess returns of non-financial listed companies in Sri Lanka.

H1a: The market risk premium is a significant determinant of the excess returns of non-financial listed companies in Sri Lanka.

H1b: The size factor is a significant determinant of the excess returns of non-financial listed companies in Sri Lanka.

H1c: The value factor is a significant determinant of the excess returns of non-financial listed companies in Sri Lanka.

H1d: The profitability factor is a significant determinant of the excess returns of non-financial listed companies in Sri Lanka.

H1e: The investment factor is a significant determinant of the excess returns of non-financial listed companies in Sri Lanka.

3.Methodology

3.1 Research Design

This study adopts an explanatory research design to examine the ability of the Fama–French Five-Factor Model proxies to explain variations in excess stock returns in the Sri Lankan capital market. Specifically, it investigates the relationships between the five key factors proxies market risk premium, size, value, profitability, and investment and the excess returns of listed firms on the Colombo Stock Exchange, with the aim of assessing the model's explanatory power in an emerging market context. The study focuses on 80 non-financial firms selected from a population of 286 listed companies using purposive sampling based on market capitalization. This approach ensures the inclusion of actively traded firms with reliable and continuous financial disclosures, while excluding financial institutions due to their distinct regulatory environments and capital structures. The analysis is based on quarterly panel data covering the period from Q1 2020 to Q4 2024. Secondary data were obtained from the official Colombo

Stock Exchange website and company quarterly reports. The balanced panel structure enables the application of panel econometric techniques, allowing the study to control for unobserved firm-specific effects and capture both cross-sectional and time-series variations in returns. This enhances the robustness and validity of the estimated relationships between the Fama–French factor proxies and excess returns. The present study uses the factor proxies instead of constructed Fama – French Factors due to the data limitations.

3.2 Research Model

The Fama-French Five-Factor model (2015) extends the original three-factor model by adding profitability and investment factors. Following the theoretical framework of the Fama–French Five-Factor Model, this study estimates a panel regression model using firm-level proxies for the five factors:

Fixed Effect Model

$$Ri_{it}-Rf_t=\alpha_i+\beta_1(Rm_t-Rf_t)+\beta_2SIZE_{it}+\beta_3BTM_{it}+\beta_4ROA_{it}+\beta_5TAG_{it}+\mu_{it} \quad \text{..... (1)}$$

Random Effect model

$$Ri_{it}-Rf_t=\alpha_i+\beta_1(Rm_t-Rf_t)+\beta_2SIZE_{it}+\beta_3BTM_{it}+\beta_4ROA_{it}+\beta_5TAG_{it}+\mu_{it}+\varepsilon_{it} \quad \text{..... (2)}$$

Where:

(Ri − Rf) - Excess return
Rf - risk -free rate
(Rm − Rf) -Market risk premium
SIZE - Market Capitalization (Size factor)
BTM- Book-to-market equity ratio (Value factor)
ROA - Return on Assets (Profitability factor)
TAG - Asset growth rate (Investment factor)
μ - Stochastic error term of firm i at time t
ε - Error term of firm i at time t

Operationalization

In this study, the Fama-French Five Factor model is operationalized by transforming its theoretical constructs into measurable variables that can be empirically test using data from listed Non-Financial companies in the Sri Lankan Stock Market. Although the original Fama–French Five-Factor Model employs factor-mimicking portfolios (SMB, HML, RMW, and CMA), this study uses firm-level proxies, namely market capitalization, book-to-market ratio, return on assets, and total asset growth, due to data limitations and the characteristics of the Sri Lankan stock market. Similar proxy-based approaches have been adopted in empirical studies examining asset pricing models in emerging and frontier markets.

Table 1: Operationalization

Variables	Indicators	Measurements	Source
Dependent variable			
Excess return	The difference between the return on stock and risk-free rate, capturing the return earned above the minimum expected compensation for bearing risk	Stock return– treasury bill rate	(Fama & French, 1993; Fama & French, 2015)
Factor Proxies			
Market risk premium	The excess market return of the overall market over the risk-free rate, representing the reward for bearing systematic risk	Market return−treasury bill rate	(Shaker & Elgiziry, 2014)
Size Factor	The total market value of a firm's outstanding shares captures the size effect whereby smaller firms are associated with higher expected returns due to greater risk exposure and information asymmetry.	(No of shares* share price) (Natural logarithm of market capitalization)	(Fama & French, 2015; Fama & French, 1993)
Value Factor	The ratio of a firm's book value to its market value, reflecting whether a stock is undervalued (high ratio) or overvalued (low ratio) by the market relative to its fundamental worth.	Book value equity/market value of equity	(Fama & French, 2015; Fama & French, 1993)
Profitability Factor	A firm's ability to generate earnings relative to its total assets, where firms with higher profitability are expected to earn higher returns as they signal	Net income/Total asset	(Fama & French, 2015; Fama & French, 1993; Chiah et al,2016 ;Thafani & Ediwickrama, 2022))

	stronger operational performance.		
Investment Factor	The rate at which a firm grows its total assets over time, reflecting its investment aggressiveness. Firms with lower asset growth (conservative investment) tend to earn higher returns.	(Total Assets t − Total Assets t-1) / Total Assets t-1	(Cooper et al, 2008; Fama & French, 2015; Fama & French, 1993; Thafani & Ediwickrama, 2022);

4. Results and Discussions

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics of the study variables, including the number of observations, mean, median, standard deviation, minimum, and maximum values for both the dependent variable (excess return) and the factor proxies: market risk premium, size, value (book-to-market), profitability, and investment. These summary statistics describe the central tendency, dispersion, and range of the data, and are useful for identifying potential outliers prior to the main empirical analysis.

Table 2. Descriptive Statistics

Variables	Mean	Std. Dev.	Minimum	Maximum
Excess return (RI−RF)	-0.2088	0.4942	-1.7431	5.3919
Market risk premium (RM−RF)	-0.2280	0.3440	-0.8900	0.2108
Size Factor (SIZE)	23.2741	1.1807	18.1500	26.6465
Value factor (BTM)	0.9916	1.6083	0.0051	39.4823
Profitability factor (ROA)	0.0355	0.0610	-0.0796	1.0872
Investment factor (TAG)	3.7107	26.8113	-84.3982	812.6414

Source: Data analysis (2026)

Table 2 reports descriptive statistics for the 1,600 sample observations. The market risk premium (RM_RF) has a mean of -0.2280 and ranges from -0.8900 to 0.2108, indicating generally negative market conditions during the study period. The size proxy exhibits a mean of 23.2741 with a standard deviation of 1.1807 (minimum = 18.1500; maximum = 26.6465), showing relatively moderate variation across firms. The value factor (BTM) has a mean value of 0.9916 and shows substantial dispersion, ranging from 0.0051 to 39.4823, indicating significant

heterogeneity in firm valuation. Profitability, proxied by return on assets (ROA), records a mean of 0.0355 with a standard deviation of 0.0610 (minimum = -0.0796; maximum = 1.0872), reflecting moderate variation in firm performance. The investment proxy (TAG) shows a mean of 3.7107 and is highly dispersed, driven by extreme values, with a maximum of 812.6414, indicating the presence of outliers in investment behavior. The dependent variable, excess return (RI − RF), has a mean of -0.2088 and ranges from -1.7431 to 5.3919, suggesting high variability in stock performance across firms and time. Overall, excess returns, value, and profitability variables are relatively closer to their mean values due to lower standard deviations, while investment and book-to-market exhibit higher dispersion, indicating greater heterogeneity among firms in the sample.

4.2 Correlation Analysis

Table 3 represents the strength of the relationships between the dependent variable (excess return) and the five Fama–French factor proxies.

Table 3. Correlation analysis

Correlation/ Probability	RI_RF	RM_RF	SIZE	BTM	ROA	TAG
Excess return (RI_RF)	1.0000					

Market risk premium (RM_RF)	0.7460**	1.0000				
	0.0000	-----				
Size factor (SIZE)	-0.0587*	-0.0915	1.0000			
	0.0188	0.0002	-----			
Value Factor (BTM)	-0.0106	0.0147	-0.3957	1.0000		
	0.6727	0.5570	0.0000	-----		
Profitability (ROA)	-0.0160	-0.0488	0.2150	-0.1171	1.0000	
	0.5228	0.0511	0.0000	0.0000	-----	
Investment (TAG)	0.0150	-0.0329	0.0092	-0.0117	0.0124	1.0000
	0.5494	0.1885	0.7140	0.6396	0.6188	-----

Source: Data analysis (2026)

*** correlation is significant at the 0.01 level*

** correlation is significant at the 0.05 level*

Table 3 presents the pairwise correlation coefficients between the dependent variable, excess return (RI − RF), and the explanatory variables. The market risk premium (RM − RF) shows a strong positive and statistically significant correlation with excess return ($r = 0.7460$, $p < 0.001$), indicating that increases in market risk premium are associated with higher excess returns. The size factor exhibits a weak negative but statistically significant correlation with excess return ($r = −0.0587$, $p = 0.0188$). In contrast, the investment proxy (TAG) ($r = 0.0150$, $p = 0.5494$), the value proxy (BTM) ($r = −0.0106$, $p = 0.6727$), and profitability (ROA) ($r = −0.0160$, $p = 0.5228$) all show no statistically significant correlation with excess returns. Overall, the results suggest

that among the explanatory variables, only the market risk premium shows a strong relationship with excess returns, while the remaining factor proxies exhibit weak or insignificant pairwise associations.

4.3 Multicollinearity Test

To assess multicollinearity among the independent variables, we tested the Variance Inflation Factor (VIF) and tolerance. VIF values were below 10 and tolerance values exceeded 0.10, indicating that there is no multicollinearity problem in the particular regression model.

Table .4 Multicollinearity test

Variables	VIF	Tolerance (1/VIF)
RM_RF	1.01	0.9891
SIZE	1.24	0.8085
BTM	1.19	0.8417
ROA	1.05	0.9516
TAG	1.00	0.9987
	1.10	

Source: Data analysis (2026)

In this study, both tolerance and Variance Inflation Factor (VIF) tests were applied to assess multicollinearity among the independent variables. As shown in Table 4, all tolerance values exceed the threshold of 0.1, and none of the VIF values exceed 10. These results confirm that there are no multicollinearity issues among the explanatory variables. Therefore, the independent variables in the Fama–French Five-Factor Model (FF5FM) are not highly correlated, allowing for reliable further statistical analysis using the specified model.

4.4 Panel data regression analysis

This study uses panel data from different firms across several years, so panel data regression was chosen to test the hypotheses. This method effectively accounts for both company-specific differences and time-related changes. To determine whether the Fixed Effects or Random Effects model is most appropriate for explaining the findings, the Hausman Specification Test was conducted.

Table 5. Hausman Specification

Test Summary	Chi-Sq. Statistic	Prob.
Fama–French Five–Factor Model	61.7840	0.0000

Source: Data analysis (2026)

Table 5 presents the Hausman test results, showing a Chi-square statistic of 61.7840 with a p value of 0.0000. Since the p-value is less than 0.05, the null hypothesis is rejected, confirming that the Fixed Effects model is the appropriate specification for this study.

Table 6. Panel data regression analysis

	random effect		fixed effect	
Variables	Coefficient	P-value	Coefficient	P-value
RM_RF	1.0751	0.0000	1.1058	0.0000
SIZE	-0.0010	0.8972	0.1002	0.0000
BTM	-0.0061	0.2690	0.0007	0.9346
ROA	0.1473	0.2827	0.1590	0.3800
TAG	0.0007	0.0180	0.0004	0.1882
observations	1600		1600	
F-statistic	403.9601		25.5739	
Prob(F-statistic)	0.0000		0.0000	
R-squared	0.5589		0.5864	
Adjusted R-squared	0.5575		0.5635	

Source: Data analysis (2026)

Based on the Hausman test results, the Fixed Effects (FE) model is selected as the appropriate specification, as presented in Table 6. The model yields an R-squared value of 0.5864, indicating that approximately 58.64% of the variation in excess stock returns is explained by the independent variables, namely the market risk premium, size, value, profitability, and investment factors. The remaining 41.36% of the variation is attributed to other factors not captured within the model. The F-statistic of 25.5739 ($p = 0.0000$) indicates that the overall regression model is statistically significant. This confirms that the Fama–French Five–Factor Model is jointly significant in explaining excess returns of non-financial listed companies in Sri Lanka, and that the model provides a good overall fit to the data. Regarding individual factor effects, the results show that the market risk premium ($\beta = 1.1058$, $p = 0.0000$) and the size proxy ($\beta = 0.1002$, $p = 0.0000$) have statistically significant positive effects on excess returns. Therefore, hypotheses H1a and H1b are supported. However, the value proxy ($\beta = 0.0007$, $p = 0.9346$), profitability proxy ($\beta = 0.1590$, $p = 0.3800$), and investment proxy ($\beta = 0.0004$, $p = 0.1882$) are not statistically significant, despite having positive coefficients. Hence, hypotheses H1c, H1d, and H1e are not supported.

5. Conclusion

This study examined the applicability of the Fama–French Five-Factor Model (FF5FM) in explaining excess returns of non-financial firms listed on the CSE during a period of significant macroeconomic turbulence. Using a panel regression approach with a Fixed Effects specification confirmed by the Hausman test, the findings indicate that the FF5FM demonstrates partial but not comprehensive explanatory power in the Sri Lankan frontier market context. The model explains approximately 58.64% of the variation in excess returns (Adjusted $R^2 = 0.5635$), indicating better performance than single-factor models such as the Capital Asset Pricing Model

(CAPM), consistent with prior evidence in Sri Lanka (e.g., Suganya et al., 2025). Among the five factor proxies, only the market risk premium and size proxies are statistically significant determinants of excess returns. The persistent significance of the market proxy aligns with empirical findings from both Sri Lankan studies (Thafani & Ediriwickrama, 2022) and international literature (Fama & French, 2015; Chiah et al., 2016). In contrast, the value, profitability, and investment factor proxies are statistically insignificant, consistent with evidence from several emerging and frontier markets (Foye, 2018). This suggests that these factor proxies may not be fully priced in the Sri Lankan market, likely due to structural inefficiencies, informational asymmetries, and limited market depth. The negative mean values observed for excess returns and the market risk premium can be attributed to the extraordinary macroeconomic environment during the Sri Lankan sovereign debt crisis of 2022. During this period, the Central Bank of Sri Lanka significantly increased Treasury bill rates to control inflation and stabilize the currency (CBSL, 2022). Consequently, elevated risk-free rates compressed excess returns, even for firms with positive nominal performance, thereby influencing conventional factor relationships. Furthermore, the observed reversal of the traditional size premium where larger firms outperform smaller firms contradicts the well-documented small-firm effect (Banz, 1981; Seneviratne & Nimal, 2008). This reversal is consistent with crisis-period dynamics, where larger firms tend to demonstrate greater resilience, liquidity access, and financial stability. Similar patterns have been observed in other emerging and frontier markets during periods of economic distress (Cox & Britten, 2019; Leite et al., 2018). The insignificance of value, profitability, and investment proxies' further highlights structural inefficiencies in the Colombo Stock Exchange, suggesting that these risk dimensions are not consistently reflected in asset prices. This aligns with broader evidence that factor premiums identified in developed markets do not always translate effectively to frontier markets, particularly under conditions of macroeconomic instability (Foye, 2018). These findings have important implications for investors, portfolio managers, and policymakers. Investors should be cautious when applying developed-market asset pricing models without adjusting for local market conditions. Policymakers should focus on improving market efficiency, transparency, and liquidity in the CSE to enhance price discovery and the effectiveness of factor-based investment strategies. However, the study has certain limitations. The sample is restricted to non-financial firms and covers a relatively short, crisis-affected period, which may limit generalizability. Future research could extend the sample to include financial firms and longer time horizons across multiple market cycles. Comparative cross-country studies across South and Southeast Asian frontier markets would further enrich the literature.

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