Journal of Policy Research, 9(3), 285-299
https://jprpk.com
https://doi.org/10.61506/02.00115

The Validity and Reliability Performance Evaluation of the Fama-French Six Risk Premium Factors Model: Evidence from the Capital Stock Market of Pakistan

Mr. Muhammad Tahir[1], Prof. Dr. Abid Usman[2]

Abstract

The study goal, aims, purpose and objective are to examine the Validity, Reliability and Performance Evaluation of the Fama-French Six Risk Premium Factor's Model: Evidence from Capital Stock Market of Pakistan. The sample used were the balance sheet and Income statements annual reports of an eligible Non-Financial Companies issued from a State Bank of Pakistan (SBP). However, the idea for portfolio creation and a breakpoint have taken from keneath french data side. The sample data is 130 Non-Financial Companies covering the actual analysis from July 2014 to June, 2019. The (2x2) = 4 sort approaches for emerging markets and returns are used to construct portfolio and breakpoints for the SMB, HML, RMW, CMA, and WML other than Mkt-Rft. A total set of 16 set of portfolios are designed from dual categorization (Bivariate) designed for separately couple of size and one additional factor. A whole set of (4x4= 16), portfolios shaped as a dependent factor typically recognized as left-hand-side portfolios (LHS) and the same for independent risk premium factors for right hand side (RHS). The study found and concluded regarding the intercepts that all 16 set of four portfolios are insignificant and there are no pricing errors in the time of cost determination and predictions. The other objectives regarding slopes are found and concluded that the slopes of all risk premium i.e., MKT, SMB, HML, RMW, CMA, and WML and along with error correction term ECT (-1) are all positives and negatives and also statistically significant and explaining and predicting the average portfolio returns for 16 set of portfolios excess returns. The third main objectives regarding the other performance evaluation indicators, proposed to FF6F model's relatively greater descriptive and explanatory power in each group of portfolios. Further, the value of R-squared is less than Durbin Watson value, means there is no sign of spurious linear regression too. Finally, it is found and concluded that the quality criteria suggests that the small values of Avg|α| or Avg|α-α¯|in all equations are as the better model. It is further found and concluded that the Avg|α| of all six risk premium factors asset pricing models are the lowest values and acceptable range. It also further found and concluded that the fGRS and pGRS display the alpha is insignificant for 16 set of portfolios The research identifies that the asset pricing models are relatively more effective for diversified portfolios than concentrated portfolios and it is challenging to find a model that is effective in explaining the variation in the returns of any portfolio, but there is the possibility of finding a portfolio which works for a model and the investors can maximize their returns with a carefully chosen portfolio based on particular characteristics with a fewer number of stocks. Study proposes that corporate managers, policymakers, financial experts, and individual investors should have a stronger understanding of how to forecast stock prices on the Pakistan Stock Market, since it will help them when they are making investment decisions.

Keywords: Fama-French Asset Pricing Models, Kenneth R. French Data Library, Emerging Markets, Jensen's Alpha, GRS F-Test

1. Introduction

1.1. Background Overview

The Asset Pricing Model of stocks and portfolios is a crucial role in financial, economic and investment decisions in stock's market valuation. Thus, investors need a high return and low risk. The Asset Pricing model plays a vital role in risk-adjusted returns. So, prices of stock need a risk-adjusted return Fama and French (2017 & 2018). Markowitz develops a model in 1952, called a mean-variance model. Thus, the model tested but criticized due to unsystematic risk. But, due to the limited evidence of these asset pricing model's performance, contradictions, methodological issues, insignificaant results, weakness in limitations, and a problem with issues suffered locally industries in emerging countries like Pakistan. As a result, these issues have an insignificant impact on the stock and portfolio. As a result, due to the lack of knowledge, the wrong selection of portfolios leads to wrong decisions. So, statistics show that some five risk premium factors are also insignificant Ishtiaq (2019), Lohano and Kashif (2019). Consequently, the efficiency decreases in the model and investors do not achieve their goals Ishtiaq (2019), Lohano and Kashif (2019). Therefore, the "Dividend Discount Model and the augmented six risk premium factors have clarified that the six risk premium factors have a significant impact on equity and portfolio returns Fama and French (2017 & 2018). Thus, the study aim is to fill the research gap and to test the validity, reliability and evaluate the performance of the Multi-Factor Asset Pricing Models (MAPM). Moreover, also to check the Effectiveness and Efficiency of the Fama-French Six Risk Premium Factor's Model: Evidence from Capital Stock Market Pakistan. It also to check the impact of the six risk premium factors like, Mkt-rft, SMBt, HMLt, RMWt, CMAt, WMLt and (ECT-1) on excess portfolio returns. Thus, the statistics contributing to the Model and update the existing knowledge. The finding of this study is contributing to academic's literature, organizations, society, and researchers respectively Fama and French (2017 & 2018). The

[1]Phd scholar, Iqra National University, Peshawar, Pakistan, Email: muhammadtahir19801980@gmail.com
[2]Professor, BRAINS Institute, Peshawar

best strategic decision needs a tool, method, and model for a selection of the best portfolio. Investors are spending extra wealth in the stock market to achieve a goal. Thus, investors do analyze stock data to earn optimal returns at less risk. The stock prices of the company are using for internal and external goals. Thus, both methods are using for analysis and forecasting future trends in stock prices. Even so, a company outside data occur innovative in the market. Both internal and external factors affect stock prices. So, it regulates the market stock price. Hence, a six risk premium factors are designed the best portfolio matrix. The cost of stock is the best tool in internal studies. Thus, the purpose is to check the Effectiveness, Efficiency, Validity and Reliability of The Fama-French Six Risk Premium Factor's Model: Evidence from Capital Stock Market Pakistan, and also to check the impact of the six risk premium factors like, Mkt-rf, SMB, HML, RMW, CMA, WML and (ECT-1) on excess portfolio returns. Most of the research tested that the FF6FM found and and concluded a significant impact of investment, profitability, and momentum on a stock return. Hence, it included investment, and momentum in the 5-Factor Model. So, the FF6-Factor model justified its validity and reliability in developed markets, Chiah et al. (2016) and Chai et al. (2019), tested FF6FM in the Australian market, and they found positive results. They further concluded that FF6FM is A powerful relative to its other competing asset pricing models. As a result, profitability, investment, and momentum factors are favorable in Australia.

2. Literature Review

2.1. Theoretical Background of Multi-Factor Asset Pricing Model

To answer some related questions about asset pricing investment valuations of stocks and portfolios returns, the researchers developed Multi-Factor Asset Pricing Models (APM). It can be can identified risk premium factors that explain price changes and variations. In other words, APM is the basis for identifying risks, assessing their intensity, and determining appropriate rewards for risk Harvey (2001). This leads to a major problem in the financial literature, namely, how to determine the true value of an assets given uncertainty Perold (2004). In addition, there is rigidity and control driven by some conceptual models in APM's relationship with other industries. Future predictions that can be verified by previous testing should be corrected, if the model is considered to predict the future, and if the model's prediction is correct after the usual testing and evaluation process. However, the assumptions underlying a particular model often cannot be evaluated. What works one time may not work another time. Since some items are still not valued correctly. Thus, to fill this Gap, this research paper should describe, correlate, explain, evaluate, and compare the performance of the anomalies of the Multi-Factor Asset Pricing model, which needs to be improved the explanatory power of the Multi-Factor Asset Pricing Models Kumar (2023).

2.2. Multi-Factor Asset Pricing Models

Each theory has some shortcomings that must be overcome by further research. The main reason is a particular model is bad is because the model does not cover all aspects of the market. In general, the size means that small companies or stock returns with market value are paid more on average than large companies in terms of return. Fama and French (1992) use CAPM firm attributes and market betas because they know that firm attributes are risk factors for volatility. They find no return of stocks is positively correlated with market prices. Additionally, that risk sensitivity can be a proxy for size and returns can be based on the role these two risks play in driving the car back to the average price. Research shows that companies with lower fixed asset returns have a higher B/M for at least five years before and after portfolio improvement. On the other hand, accordingly, companies with good profitability and strength result are consistent with Chan and Chen's (1991) finding that market returns cannot overcome the identified fixed problem and must be repaid in the middle. Fama and French (1996) use FF3FM to model E/P, C/P as return data risk. According to the research This conclusion is based on evidence that capital markets do not explain the variance of distressed stocks. Similarly, market returns do not reflect normal fluctuations in the returns of troubled companies. One test of the above argument is to examine the value of the premium complement this link in the literature with international evidence of overpricing in the US stock market and 12 other countries in Australia, Europe, and the Far East. A lot of value can be found in the sample compared to the American market.

2.3. Fama and French Five-and Six Factor Model

The Fama and French (2015,2017 & 2018) consider five and six risk premium factors related to expected portfolio return, i.e., Mkt, size, value, profitability, investment, and momentum correspondingly. According to the equation and discount model, this study supports the hypothesis that higher investment is associated with lower returns when the stock is more profitable than expected return, controlling for price (B/ratio M) and profitability. Similarly, Hou et al. (2015) examine about 80 anomalies in the literature over the 40-year period from 1972 to 2012, mostly based on the q-method of American financial markets. Additionally, the five-factor model with recent evidence that two types of risk (profitability and investment) are associated with asset returns. It has to do with market, size, value, profitability, and investment to meet capital. However, the model avoids a low average return for high-investment in small items. Although FF5FM outperforms all previous asset prices, the main problem with this model is that small companies with low investment cannot capture stock returns, but results are low Fama and France, (2015). Although FF5FM has been tested in the US stock market and other developed countries, but there is still no tested application in the emerging market Foye (2018). In addition, not

all products in the regional market require investment and size. In contrast, when testing FF5FM on option design and market efficiency, Mosoeu and Kodongo (2022) found that the stock was the largest factor explaining average returns. However, the study found was in AER market economies. First, returns are a better indicator of investments in banks' target markets, like many emerging markets. Second, many emerging market companies, where investments can to control so previous investments are not for future growth.

2.4. Econometric Model

$R_{pt} - Rf_t = \alpha_{pt} + \beta_{1p}(Rm_t - Rf_t) + \beta_{2p}(SMB_t) + \beta_{3p}(HML_t) + \beta_{4p}(RMW_t) + \beta_{5p}(CMA_t) + \phi_{6p}(WML_t) + \varepsilon_{pt}$…… (2.1)

Where,

E (Rp)-Rft (Excess return of portfolios over risk-free rate)

E (Rmt-Rft) (Market premium i.e., market return over risk-free rate)

E (SMBt) (Size premium)

E (HMLt) (Value premium)

(RMW_t) is the difference between the returns on diversified portfolios of stocks with robust and weak profitability.

(CMA_t) is the difference between the returns on diversified portfolios of the stocks of low and high investment firms, which we are calling conservative and aggressive?

(WMLt) (Momentum, earning premium) or Average returns of winning minus losing stock according to total return index at time t.

eit: unsystematic risk for the p:th portfolio at time t.

The Coefficients of beta's (βi's andϕ_6) represents their sensitivity and expressing multiple regression slopes of E(Ri) - Rf and Rm-Rf, SMB, HML, RMW, CMA and WML. If the exposures to the five factors along with Momentum Risk Premium Factor i.e, β_1 ,β_2 ,β_3 ,β_4, β_5 and ϕ_6 captures all variation in the expected returns, and the intercept $\boldsymbol{\alpha_0}$ in the above equation is zero for all securities and portfolios i, then we say in this case that this is a good fit and valid Model.

2.5. Empirical Testing of Multi-Factor Asset Pricing Models in developed Countries

Iqbal et al. (2017) found and concluded that ''the result of the statistical test shows that the Market Risk Premium (MRP) positive sign justify the risk of investing within the portfolio with higher excess return''. This can be in step with the findings and supporting results of positive impacts by Kim (1997), Banz (1981), and Verma (2011), found and concluded that there is a significant size effect (SMB) on excess portfolio return. A zero-cost small-minus-big (SMB) portfolio produces an average premium of 0.61% per month that is statistically substantial through a t-value of 2.89 and economically important. Bektić et al. (2019) found and concluded that the explanatory power of value factor exhibits economically and statistically significant excess portfolio returns.

2.6. Empirical Testing of Multi-Factor Asset Pricing Models in Developing Countries

Iqbal et al. (2017) found and concluded that ''the Market Risk Premium (MRP) positive sign justify the risk of investing in the portfolio with higher excess return''. This is alined with the findings and supporting results of positive impacts by Kim (1997); Banz (1981); Verma (2011); Ward and Djajadikerta (2009). Also, Abbas et al. (2015) found and concluded that the model holds true for stocks listed on KSE-100 from July 2004 to June. The estimation results are also in line with Fama and French (1992, 1993) study results, which show that higher return on small stocks is explained by difference in the slope of small and big stocks with positive average SMB return. The estimation results show that the slope of small stocks is higher than the slope of big stocks and average return on SMB is found to be positive. Moreover, we also found that the value stocks (High B/M stocks) have higher return than growth stocks (low B/M stocks) too. The (HML) slope's positive impact of 15% increase in excess return. This means that the HML stocks are outperforming growth stocks in Pakistan Stock Exchange. Accordingly, the results are similar to those of Fama and French in terms of US stock markets. Fama and French concluded that the six-factor model could better explain stock returns in the US market.

2.7. Hypothesis Development

The author is in a position to test and rejecting the following specific hypothesis for the purposes and objectives to achieving the study goals. The first objective is the following alternative hypothesis (Ha's) are to be tested for alpha (αi) i.e, (intercepsts) analysis and the the second objective is the null hypothesis (Hn's) are to be tested for the beta's i.e, (slopes) analysis.

2.7.1. Intercept (alpha, αpt's) of Alternative Hypothesis analysis

2.7.2. Internal and External Reliability (within and between groups)

1: Ha: The intercept (alpha, αpt's) is statistically significant effect on the excess portfolio returns.

2.7.3. Slope (beta, bpt's) of Null Hypothesis analysis

2.7.4. Internal and External Validity (within and between groups)

1: Hn: The Market Risk Premium factor (Mkt-Rft) is statistically insignificant effect on the excess portfolio returns.

2: Hn: The Size risk Premium factor (SMBt) is statistically insignificant effect on the excess portfolio returns.
3: Hn: The Value risk Premium factor (HMLt) is statistically insignificant effect on the eexcess portfolio returns.
4: Hn: The Profitability risk premium factor (RMWt) is statistically insignificant effect on the excess portfolio returns.
5: Hn: The Investment risk premium factor (CMAt) is statistically insignificant effect on the excess portfolio returns.
6: Hn: The Momentum risk premium factor (WMLt) is statistically insignificant effect on the excess portfolio returns.
7: Hn: The Error Correction Term (ECT-1) is statistically insignificant effect on the excess portfolio returns.

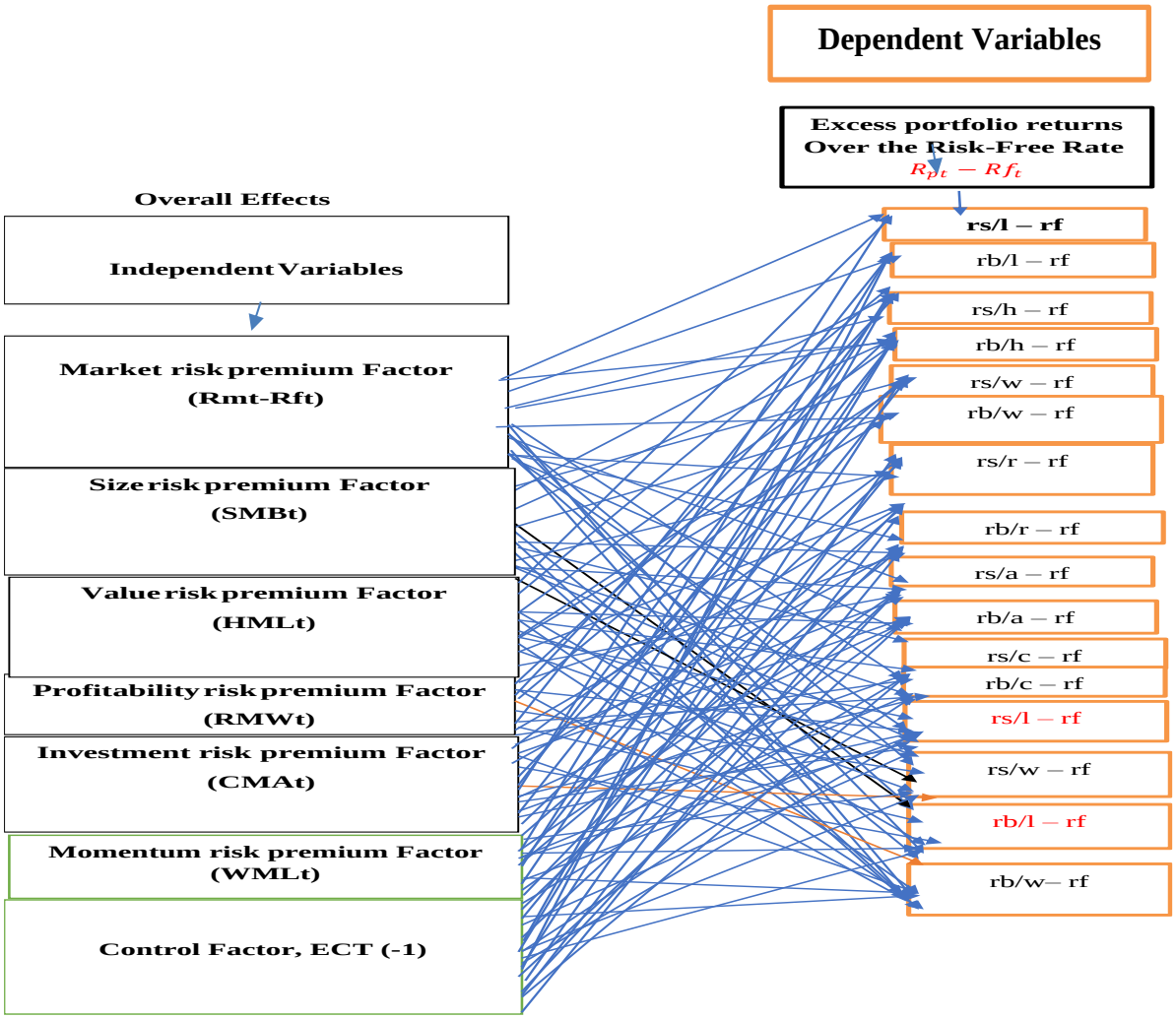

Figure 1: The Conceptual and Theoretical Framework (Empirical Analysis)

3. Research Methodology

3.1. Methodology, Research Design, and Data Analysis

As this research is based on the positivist, deductive and a causal-effect for six risk premium factors. Thus, the focuses on understanding and how well the six-risk premium factor model i.e., Fama and French (2014, 2015 & 2018) works on the excess portfolio returns in the non-financial sector of Pakistan. It is to focusing on the panel data (time series and cross sectional) which are too effective. The data analysis of the historic Pakistan Stock Exchange data is to evaluate the FF6FM with the panel data. The calculation of each Fama French factor is doing on a cross-sectional basis and a time series level for each time of 1 month in a year from July 2014 to June 2019. Thus, we are using a purposive sampling technique, which is a non-probability sampling technique. The data are collected from the annual report of the firms, which are issued by the State Bank of Pakistan. Further, the data are collecting from the non-financial Sector's corporate's financial statements i.e., balance sheet and income statements, which is issuing by the State Bank of Pakistan (SBP). This research paper's aim and purpose are to develop a better understanding of the risk premium factors, which are bound, and included in our research paper, and excluded those factors which are not related to our purpose of the research.

The total population is of non-financial sector's Companies lies in Pakistani region, so, our target population is the whole universe of Pakistan Stock Exchange. Consequently, the elements are in the different sectors of our accessible population are, "Automobile assembler, Automobile parts & accessories, Cable & electrical goods, Cement, Chemical, Engineering, Fertilizer, food & personal care products, Glass & ceramics, Leather & tanneries, Oil & gas exploration companies, Oil & gas marketing companies, Paper & board, Pharmaceuticals, Power generation & distribution, Refinery, Sugar & allied industries, Synthetic & rayon, Technology & communication, Textile composite, Textile spinning, Textile weaving, Tobacco, Transport, Vanaspati & allied industries and Woolen''. The sample size is approximately 362 as a match with Morgan has tabulated sample size ratio in their respective table. The sample size is a representative of an accessible sub-target population. There are the average 187 Non-Financial Companies in PSX, as per annual report from 2014 to 2019. Thus, the eligible sample size representatives' units are 130. Although there are different sets of analyses essential to extract answers to the research question, the type of quantitative analysis is very much the same from one question to the next. Further it conveys the LHS, RHS, GRS statistics and procedures to measure the asset pricing models to describe the Portfolios excess returns of the sort of (2×2) = 4 i.e., Size-HML, Size-RMW, Size-CMA and Size-WML, which becomes 16 different set of portfolios in the combination of different sectors in the non-financial companies of (PSX). In detail, there Would be debating for 16 sets of LHS side portfolios $2 \times 2 =$ 4x4=16, i.e.,$((2, \text{Small \& Big sizes} = \text{Each } 50\%) \times (2, \text{High \& Low B/M} = \text{Each } 50\%)) = ((4, \text{SL, SH, BL \& BH})), 2 \times 2 = 4 =$ 4x4 , 16 and examine the impact of the RHS six risk premium factors of Fama-French Assets Pricing Model's on AER. The same procedures are required for the remaining three set of portfolios as well like Size-RMW, Size- CMA and Size-WML. The sample has been retrieved from Pakistan Stock Exchange websites, Business Recorder and SBP Annual reports. This research comprises monthly portfolios risk premium factor returns for all six factors used in the FF6FM for 16 set of portfolios. The total returns include Cash Dividend, Bonus shares, Right Shares, Stock Shares, and capital gains which are adjusted in price adjustments after corporate actions took place, which are measured in Pakistani Rupees (Rs.). The monthly average returns are based on simple (discreet), and not on continuously compounded (log Returns), but continuously compounded (log Returns) or cumulative return, should be considered only for momentum factor in the factor's breakpoints and portfolio construction's time. Further, the FF6FM are created using value-weight portfolios (VWP) designed on size-B/M, the 4 size/OP, the 4 size/Inv. and 4 size/momentum factors, which becomes a total of (2x2 = 4, and 4x4=16. To designed the SMBt, HMLt, RMWt, CMAt and WMLt risk premium, we sort two stocks each in a different industries/firm's portfolios i.e., SMB, B/m ratio, RMW, CMA, and (Mom or WML) for June t. The Big shares are those in the top 50% in June (SMB) for the industries/portfolio, and small stocks in bottom 50%. The B/M, OP, INV and Mom breakpoints for an industries/portfolio are the 50th and 50th percentiles for the big stocks and small stocks of the industries/portfolio. After the portfolio constructions, ranked and percentile, we created procedures for stocks/portfolios i.e., the RmRf for July t to June t+1, include all stocks for which we have market equity data for June of t. SMBt, HMLt, RMWt, CMAt and WMLt for July t to June t+1, include all stocks with market equity data for December of t-1 and June of t, (positive) book equity data for t-1 (for SMB, HML, and RMW is the cost of goods sold, selling, general and administrative expenses, or interest expense for t-1 (for SMB and RMW), and total assets data for t-2 and t-1 (for SMB and CMA). At the end of the construction of portfolios and the above procedure, we created the value weighted average stock/portfolio monthly and yearly return i.e., SMB (B/M) = 1/2 (Small Value + Small Growth) - 1/2 (Big Value + Big Growth). The SMB (Small minus Big) is the average return on the 4 small stock portfolios minus the average return on the 4 big stock portfolios. The HML (High Minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios. The SMB (OP) = 1/2 (Small Robust + Small Weak) - 1/2 (Big Robust + Big Weak). The RMW (Robust Minus Weak) is the average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios. The SMB (INV) = 1/2 (Small Conservative + Small Aggressive) - 1/2 (Big Conservative + Big Aggressive). The CMA (Conservative Minus Aggressive) is the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios. Finally, the SMB (Mom) = ½ (Small Winner + Small Loser) - 1/2 (Big Winner + Big Loser). the WML (Winner Minus Loser) is the average return on the two winner momentum portfolios minus the average return on the two Loser momentum portfolios. To remember in Between July 2015 and up to June 2019, the SMBt is the average of the SMBt (Average) = SMBt (B/M) + SMBt (OP) + SMBt (Inv) + SMBt (Mom) like SMBt = 1/4 (SMBt (B/M) + SMBt (OP) + SMBt (INV + SMBt (Mom))). The methodology used in this research paper is mainly based on Fama and French (2015), Leite et al (2018) and Foye (2018) etc. This methodology is measured standard, reliable, and used in both the developed and developing markets.

3.2. The Econometric Model of Multi-Factor Asset Pricing Models

3.2.1. Fama-French Six Factor Model (FF6FM)

5. $$R_{pt} - Rf_t = \alpha_{p,t} + \beta_p(RM_t - RF_t) + \beta_p(SMB_t) + \beta_p(HML_t) + \beta_p(RMW_t) + \beta_p(CMA_t) + \beta_p(WML_t) + \phi_p(ect - 1) + \varepsilon_{pt}. (\mathbf{3.1})$$

In the above equations (3.1) ERp, (t) is the excess return on portfolio p for different set of portfolios i.e., the Excess Market Returns RMPt, SMBt (size) HMLt (value), RMWt (profitability), CMAt (investment), and WMLt (momentum) risk premium factors, error correction term (ECT-1) is controlling for disequilibrium, and error term e_{pt}. While, the slopes of risk premium factors are βp, sp, hp, rp, cp and mp capturing difference in portfolios (AER), the intercept α is zero for portfolio p's. If the exposures to the six risk premium factors along with error correction term (Ect-1) i.e., β_1 ,β_2 ,β_3 ,β_4, β_5 and ϕ_6 captures all variation in the expected returns, and the intercept $\boldsymbol{\alpha_0}$ in all equations (3.1 to 3.5) is zero for all securities and portfolios p, then we say in this case that this is a good fit reliable and valid Model.

4. Data Analysis and Findings

4.1. Sample Characteristics and Descriptive Statistics of 4 Size-B/M, 4 size WML, 4 size-CMA. 4 and Size- WML set of Portfolios.

The table 1, shows the number and percentage of stocks included in A four set of portfolios formed according to their constructions and break point as discussed in methodology section and created 16 set of portfolios, i.e., ''(SL, SH, BL, BH, SR, SW, BR, BW, SC, SA, BC, BA, SW, SL, BW & BL)''.

Table 1. Summary Statistics of yearly Average Percent of stocks in regression Portfolios of Non-Financial Firms

Sample Period: July,2014-June, 2019							
Computations: Average Percentage of Stocks: Average Number of Stocks/ Total Number of Stocks (130) **Panel A: Size – Value (HML) Portfolios**							
Average number of Stocks in four Size-B/M Portfolios				**Panel B: Average Percentage of Stocks in four Size-B/M Portfolios**			
	Low	High	Total		Low	High	Total %
Small	**14**	**51**	65	Small	10.7692308	39.230769	50%
Big	51	14	65	Big	39.2307692	10.769231	50%
Total	65	65	130	Total	50%	50%	100%
Panel B: Size – Operating Profitability (RMW) Portfolios							
Average number of Stocks in four Size-RMW Portfolios				**Panel B: Average Percentage of Stocks in four Size-RMW Portfolios**			
	Weak	Robust	Total		Weak	Robust	Total
Small	35	30	65	Small	26.9230769	23.076923	50%
Big	30	35	65	Big	23.0769231	26.923077	50%
Total	65	65	130	Total	50%	50%	100%
Panel C: Size – Investment (CMA) Portfolios							
Average number of Stocks in four Size-CMA Portfolios				**Panel B: Average Percentage of Stocks in four Size-CMA Portfolios**			
	Conservative	Aggressive	Total		Conservative	Aggressive	Total
Small	36	29	65	Small	27.6923077	22.307692	50%
Big	29	36	65	Big	22.3076923	27.692308	50%
Total	65	65	130	Total	50%	50%	100%
Panel D: Size – Momentum (WML) Portfolios							
Average number of Stocks in four Size-WML Portfolios				**Panel B: Average Percentage of Stocks in four Size-WML Portfolios**			
	Loser	Winner	Total		Loser	Winner	Total
Small	37	28	65	Small	28.4615385	21.538462	50%
Big	28	37	65	Big	21.5384615	28.461538	50%
Total	65	65	130	Total	50%	50%	100%

4.2. Average number and % of Stocks in 4 Size-B/M, 4 size WML, 4 size-CMA. 4 and size- WML set of Portfolios.

The Panel A, B, C, & D found and concluded that after the price adjustment of 16 set of portfolios i.e., the individual averages number and % of 4 Size-B/M, 4 size WML, 4 size-CMA. And 4 and size- WML i.e., ''(SL, SH, BL, BH, SR, SW, BR, BW, SC, SA, BC, BA, SW, SL, BW & BL)'' are 14, 51, 51, and 14, and 35, 30, 65, 30, 35, and 36, 29, 65, 29, 36, and 37, 28, 28 and 37, and individual averages % of stocks are 10.7692308%, 39.230769%, 39.2307692%, and 10.769231%, and 26.9230769%, 23.076923%, 23.0769231% and 26.923077%, and, 27.6923077%, 22.307692%, 22.3076923% and 27.692308%, and 28.4615385%, 21.538462%, 21.5384615%, and 28.461538%. As we can see above, out of the 16 set of portfolios, only the

eight set of portfolios average number of stocks are high and the remaining eight are low in numbers, i.e., the S/H, B/L, SW, BR, SC, BA, SL, and BW are high in numbers, and the remaining i.e., SL, BH, SR, BW, SA, BC, SW, and BL are low in numbers. However, the same case as follows in average % of stocks as above. Therefore, it states that the small size, high book to market ratio and big size low book to market ratio average number and % of stocks is high. While, the small size, low book to market ratio and big size high book to market ratio average number and % of stocks is very low. It also states that the small size, Weak Op. Profitability (SW), and big size Robust Operating Profitability (BR) average number and % of stocks is high. While, the small size, Robust Operating Profitability (SR) and big sizes Weak Op. Profitability (BW), average number and % of stocks are low. It further states that the small size, Conservative Investment (SC), and big size Aggressive Investment (BA) average number and % of stocks is high. While, the small size, Aggressive Investment (SA) and big sizes Conservative Investment (BC), average number and % of stocks are low. Similarly, it states that the small size, Loser (SL), and big size Winner (BW) average number and % of stocks is high. While, the small size, Winner Momentum (SW) and big sizes Loser Momentum (BL), average number and % of stocks are low. Table 1, panel A, vertically, the size effect in low B/M column is not expecting in line with, means the small size is under performed than big size companies Benali et al. (2023). While, the size effects are expecting for the remaining panels B, C and D, is in line with, means the small size companies is out performed than big size companies, Bereket (2014) and Fama and French. While, in table 1, panel A, horizontally, the value effect in high B/M row is expecting in line with, means the high B/M Ratio in small size is out performed than low B/M Ratio in small size companies, Bereket (2014) and Fama and French. While, the value effects are not expecting for the remaining panels B, C and D, is in link with, means, the high B/M Ratio in mall size is under performed than low B/M Ratio in small size companies, Benali et al. (2023). However, in table 1, panel A, the value effect in high B/M row is not expecting in link with, means the high B/M Ratio is under performed than low B/M Ratio in big size companies, Benali et al. (2023). While, the value effects are expecting for the remaining panels B, C and D, is in link with, means, the high B/M Ratio is outperformed than low B/M Ratio in big size companies, Bereket (2014) and Fama and French (2018).

4.3. Summary Statistics of LHS Average Excess Return & Standard Deviation

The Summary portfolio information offer monthly AER for a group of four set of portfolios with 50% each group i.e., (2x2=4), covering the 60-month observation period from July 2014 to June 2019. The following table shows the average mean monthly percent excess returns designed on Size-B/M, Size-OP, Size-Inv, and size-Mom. from July 2014–June- 2019.

Table 2. Statistics for the Monthly % Excess portfolios Returns & Standard Deviation

Fama & French Asset Pricing Six Factor Model (FF6FM) (2x2 = 4)					
Panel A: Size - B/M (HML) Portfolios					
Average Excess Portfolio returns			**Standard deviation**		
	Low	High		Low	High
Small	0.0032	-0.00022	Small	17.2	45.3
Big	-0.029	0.015	Big	74.6	41.3
Fama & French Asset Pricing Six Factor Model (FF6FM) (2x2 = 4)					
Panel B: Size - Operating Profitability (RMW) Portfolios					
Average Excess Portfolio returns			**Standard deviation**		
	Weak	Robust		Weak	Robust
Small	0.43	-0.52	Small	100.4	188.50
Big	0.0017	0.050	Big	10.48	139.88
Fama & French Asset Pricing Six Factor Model (FF6FM) (2x2 = 4)					
Panel C: Size - Investment (CMA) Portfolios					
Average Excess Portfolio returns			**Standard deviation**		
	Conservative	Aggressive		Conservative	Aggressive
Small	-0.18	-0.70	Small	180.8	152.43
Big	0.49	0.58	Big	111.39	189.1
Fama & French Asset Pricing Six Factor Model (FF6FM) (2x2 = 4)					
Panel D: Size - Momentum (WML) Portfolios					
Average Excess Portfolio returns			**Standard deviation**		
	Loser	Winner		Loser	Winner
Small	1.12	-0.29	Small	375.39	403.59
Big	-0.62	-0.24	Big	269.32	285.7

The empirical examination of this research is supposed to examine whether the proposed FF6FM well define the Average Excess Portfolio returns (AER) on the portfolios created to produce a massive spread in Excess market return (MkPt), Size (SMBt), value (HMLt), profitability (RMWt), investment (CMAt), and momentum (WMLt). Outlining ready the shapes of returns for the primary set of portfolios on the vertical in Panel A in each B/M

(low & High) column, or AER on portfolios for size quintiles only, designate that the AER characteristically reduced from microcap to mega- cap stocks solitary for column one (low B/M) i.e. (from 0.0032 to -0.029 per month), which means that small-sized portfolios tend to benefit from low book-to-market ratios. It supports the observed suggestion of AERs decreasing when affecting from small to big stocks. However, the AER characteristically increase from micro-cap to mega-cap stocks for column two (High B/M)- i.e., (from -0.00022 to 0.015 per month), which means that the big-sized portfolios tend to benefit from high book-to-market ratio. It does not care the observed indication of AERs decreasing when affecting from small to big stocks. As a result, the non-financial company's data of Pakistan Stock Exchange reveals that vertically, the small-sized companies with low B/M ratios have the highest monthly excess returns than the big-sized low B/M ratios. However, the big-sized companies with high B/M ratios have the highest monthly excess returns than the small-sized high B/M ratios. Finally, the Worst performers are big-sized companies with low B/M ratios; and the small-sized companies with high-B/M ratios. The value effect expectation is that stocks with high B/M referred to as value stocks have outperform stocks with low B/M (growth stocks), Banz (1981), Fama and French (2015), which is in lined with our study for big size and high book to market ratio and vice versa. Here and now, turn to the standard deviation in Panel A, table 2, the comparatively high standard deviation of the returns on shares in microcap (small-sized) risky B/M value (high B/M) portfolio specify that the shares in this portfolio are extra instable than the shares in the microcap extreme low B/M growth (Low B/M) portfolio. Nevertheless, when the average returns decreases then the volatility (risk) increase from the leftmost to rightmost portfolios in the small Size low B/M towards small size High B/M ratio. Whereas, when the average returns increases then the volatility (risk) decrease from the leftmost to rightmost portfolios in the big Size low B/M towards big size High B/M ratio. However, the same case is for the small size into big size set of portfolios. Similar results were found in Sharif et al. (2018) for PSX. In the same table3, the Panel B presents the average portfolios returns over excess of risk-free rate on four portfolios formed on size and profitability. The size effect is the same as panel A. Similarly, the value effects are when the average AER is high for stocks in robust profitability portfolios in big size portfolios, while, the AER is high for stocks in weak profitability portfolios in small size portfolios and vice versa. However, the standard deviations in table 2 of Panel B show that the portfolios of small size and robust profitability i, e; 100.4 < 188.50 are more volatile than smaller portfolios with weak profitability. However, horizontally, big portfolios and robust profitability i, e; 10.48 < 139.88 are more volatile than small portfolios with weak profitability. Whereas, vertically, the small size portfolios are more volatile than big size portfolios in weak profitability, that is, 100.4 > 10.48. However, the small size portfolios are more volatile than big size portfolios in robust profitability, i.e., 188.50 > 139.88. In the same table3, the Panel C presents, for microcap portfolios horizontally, the return falls from -0.18% to per month for shares in the intense aggressive portfolio to -0.70 % per month for shares in the intense aggressive portfolio, whilst for mega-cap portfolios, the AER upward thrust from 0.49 % to 0.58 % per month for shares in the excessive aggressive portfolio to shares in the excessive aggressive portfolio. However, vertically, for the first size in micro-cap quintile, that AER will increase from -0.18 % for shares in the severe conservative portfolio to 0.49 % per month closer to mega-cap portfolio, then in the micro-cap aggressive quantile the average return additionally will increase from -0.70 % to 0.58 % per month with an extend in investment. Again, in table3, Panel C, the standard deviations exhibit that the horizontally the funding consequences of small size and Conservative Investment portfolios i, e; 180.8 > 152.43 are greater risky than the small size Aggressive Investment portfolios. However, once more horizontally, the big size and Aggressive Investment portfolios i, e; 111.39 %< 189.1% are greater unstable than the big size Conservative Investment portfolios. While, vertically, the size outcomes of small size portfolios are extra risky than the big size portfolios in Conservative Investment portfolios i.e., 180.8 % > 111.39 %. However, the big size portfolios are extra risky than the small size portfolios in Aggressive Investment portfolios i.e., 152.43 % < 189.1 %. In the same table3, the Panel D presents, for shares in micro-cap portfolios, the return greater from 1.12 % to -0.29% per month on excessive performing (loser) shares to low performing (winner) shares from t-12 to t-2 months, whilst for shares in mega-cap portfolios, the return greater from -0.24 % to -0.62 % per month on excessive performing (winner) shares to low performing (loser) stocks, or the decrease returns from -0.62 % per month on shares in excessive momentum quintile to -0.24 % per month on the portfolio in best momentum quintile. However, the size impact in loser quintile of momentum that is AER decline from micro-caps to mega-caps portfolios i.e., 1.12 % to -0.62 %. However, the size impact is extra evident in the past winner quintile or rightmost column, the place the relationship between return and size is now not that a great deal better as -0.29 % to -0.24 %. For instance, the returns of past winner shares make bigger from micro-cap toward mega-cap portfolios. While, the standard deviations in Panel D table3, exhibit that horizontally the Momentum outcomes of small size and Winner Momentum portfolios i, e; 403.59 > 375.39 are greater risky than the small size loser Momentum portfolios. However, once more horizontally, the big size and Winner Momentum portfolios i, e; 285.7 > 269.32 are greater unstable than the big size loser Momentum portfolios. While, vertically, the size results of small size portfolios are extra unstable than the big size portfolios in loser Momentum portfolios i.e., 375.39 > 269.32 However, once more the small size portfolios are greater risky than the big size portfolios in Winner Momentum portfolios i.e., 403.59 > 285.7.

4.4. Summary Statistics for Monthly (RHS) Risk Premium Factors Percent Returns

The Table 3 displays the average, the standard deviations, the t-statistics, and P. Values for the average returns of the factors.

Table 3: Averages, standard deviations, and t-statistics for monthly returns

Sample Period: 2014M07 2019M06							
Risk Premium Factors		**D(RM_RF)**	**D(SMB)**	**D(HML)**	**D(RMW)**	**D(CMA)**	**D(WML)**
Monthly	Average mean	-0.016	*-0.069*	*0.016*	*-0.39*	*0.22*	*-0.56*
Monthly	S.D.	*8.2*	*86.40*	*63.781*	*101.5*	*233.51*	*611.9*
	Test-Statistic (T)	-0.48	-0.12	0.06	-0.90	-0.22	-0.20
	Hypothesizes Mean (μ)	0.000	0.000	0.000	0.000	0.000	0.000
	P-Value	0.52	0.81	0.91	0.31	0.79	0.81
		Fails to Reject Ho, at each and every level	Fails to Reject Ho, at each and every level	Fails to Reject Ho, at each and every level	Fails to Reject Ho, at each and every level	Fails to Reject Ho, at each and every level	Fails to Reject Ho, at each and every level
Annual	Average mean	-0.30	-0.81	0.21	-4.5	2.1	-6.1

Starting out in table 3, the market premium d(MKT), Size Risk Premium Factor (SMB), Book/Market Risk Premium Factor (HML), Operating Profitability Risk Premium Factor (RMW), Investment Risk Premium Factor (CMA), and Momentum Risk Premium Factor (WML) for shares in the PSX for 2014-2019 amounting to -0.016 %, 86.40 % , -0.069 % , (0.016 % , (- 0.39 % , (0.22 % , and (-0.56% per months and similarly 8.2 % , 86.40 % , 63.781, 101.5 % , 233.51 % , and 611.9% per months S.D.'s and the p-values are 0.52, 0.81 , 0.91, 0.31 , 0.79 , 0.81 per months illustrate that the Market Risk Premium Factor, size, rmw, and wml is statistically insignificant, means that the mean value of Market Risk Premium Factor, size, rmw and wml is less (<) than the Hypothesizes Mean (μ) -0.016, -0.069 % , (- 0.39 % , and -0.56% < 0.0000).However, the HML, and CMA is also statistically insignificant, means that the mean value of hml and cma is greater (>) than the Hypothesizes Mean (μ), i.e., (0.016 %, and 0.22 % > 0.0000). Therefore, the existence of size effect in PSX shares is maintained by the outcomes and reliable with results of Sharif et al. (2018) for PSX, Zaremba and Konieczka (2015). This result is in line with, Hoang and Phan (2019).

4.5. Correlation Matrix

The table 4 display the outcome of the correlation matrix for examining risk premium factors constructed under the (2x2 = 4) sort portfolios breakpoints. It further shows the co-variance, Correlation, T-Statistic & P. Values.

Table 4: Correlations Matrix between different Risk Premium Factors

Variance Analysis
Sample: 2014M07-2019M06
Included observations: 60

	D ($R_M - R_f$)	**D(SMB) Correlation Probability**	**D(HML) Correlation Probability**	**D(RMW) Correlation Probability**	**D(CMA) Correlation Probability**	**D(WML) Correlation Probability**
D ($R_M - R_f$)	1.000000 ---					
D(SMB) Correlation Probability	-0.18 0.0014***	1.000000 ---				
D(HML) Correlation Probability	0.030 0.57	-0.11 0.074*	1.000000 ,,,,,,,,,,,,			
D(RMW) Correlation Probability	-0.011 0.81	0.061 0.11	-0.12 0.04**	1.000000 --------		
	D ($R_M - R_f$)	**D(SMB) Correlation**	**D(HML) Correlation**	**D(RMW) Correlation**	**D(CMA) Correlation**	**D(WML) Correlation**

		Probability	Probability	Probability	Probability	Probability
D(CMA)						
Correlation	-0.10	0.21	0.019	0.010	1.000000	
Probability	0.061*	0.0001***	0.58	0.69	--------	
D(WML)						1.000000
Correlation	-0.10	0.055	-0.039	-0.0041	0.012	
Probability	0.06*	0.21	0.51	0.91	0.80	--------

The Table 4 demonstrate that the market risk premium return factor is negatively correlated with size, Profitability, Investment and Momentum factors. The SMB risk premium factor is positively corelated with profitability factor (RMW) factor which is consistent with the fact that the stocks with small size values tend to invest in robust profitability and big size to invest in weak profitability portfolios. Similarly, the SMB risk premium factor is positively correlated with investment factor (CMA) which is consistent with the fact that the stocks with small size values portfolios tend to invest conservatively and big size stocks tend to invest aggressively. The SMB risk premium factor is positively correlated to the Momentum factor (WML) which is consistent with the fact that the stocks with small size values tend to invest in winner stocks and big size stocks tend to invest in loser momentum portfolios. Finally, the HML risk premium factor is positively correlated to the value with investment factor (CMA) which is consistent with the fact that the stocks with high B/M values tend to invest in conservative stocks and low B/M growth stocks tend to invest in aggressive investment portfolios. The, RMW factor, is positively corelated with investment CMA factor, which is consistent with the fact that the stocks with robust values tend to invest in conservative stocks, and weak vales stocks tend to invest in aggressive values stocks, Fama and French (1993 & 2015). The, CMA factor, is positively corelated with momentum factor WML factor, which is consistent with the fact that the stocks with conservative values tend to invest in winner stocks, and aggressive values stocks tend to invest in loser values stocks, However, the SMB factor is negetive correlated with HML, which means that small size stocks tend to invest in lower b/m stocks. Although, a weak correlation is observed among few risks premium factors like, the Market risk premium factor (MKT) with size factor (SMB) at 1% significant level and a negetive weak correlation. Finally, a negetive weak correlation of the Market risk premium factor (MKT) with (WML) factor observed at 10% significant level. Thus, the inclusive outcomes presented that the correlation amongst all risk premium factors is insignificant besides not at all multicollinearity amongst clarifying risk premium factors occurs.

5. Summary Statistics for Portfolio Characteristics

5.1. Size-B/M-OP.Inv.-Mom. portfolios

The time-series averages of B/M, OP, Investment, and MOM for portfolios sorted on size- B/M-OP.-Inv.-Mom., and one different portfolio attribute like B/M, OP, Investment, and MOM, as 2nd sorting variable are calculated from July, 2014 to June, 2019. Then every size quintile is in addition kinds into 4 B/M (low B/M growth shares to high B/M value stocks), OP (weak/lowest profitability to robust/highest profitability),Investment (conservative/low investment shares to aggressive/high investment stock) and MOM (loser/lowest Momentum to winner/highest Momentum stocks) quintiles, by way of this technique every size quintile grew to become into 4 B/M, OP, Inv, and MOM portfolios, and complete sixteen (16) portfolios are produced by way of every set of 4 size quintiles.

Table 5 a: Time-Series Averages of B/M, OP, Inv., and MOM for Portfolios Formed on Size-B/M portfolios

Size & B/M Ratio		
Book to Market (B/M Ratio)	**Low-B/M**	**High-B/M**
	B/M	
S	**-0.063**	**0.063**
B	**-0.89**	**0.89**
OP		
S	**-0.00011**	**0.00011**
B	**0.00011**	**-0.00011**
Investment		
S	**0.00019**	**-0.00019**
B	**-0.00019**	**0.00019**
Momentum		
S	**-0.00053**	**0.00053**
B	**0.00053**	**-0.00053**

Table 5 b: Time-Series Averages of B/M, OP, Inv., and MOM for Portfolios Formed on OP. portfolios

Size & Profitability Ratio		
Operating Profitability (OP)	**Weak/Low B/M**	**Robust/High B/M**
	B/M	
S	-0.061	0.028
B	0.058	0.59
OP		
S	-0.88	0.87
B	-0.021	-0.028
Investment		
S	0.0039	-0.0055
B	-0.0037	0.012
	Momentum	
S	**0.0011**	**-0.0012**
B	-0.0014	0.0041

Table 5 c: Time-Series Averages of B/M, OP, Inv., and MOM for Portfolios Formed on Size. Inv portfolios

Size & Investment Ratio		
Investment	**Conservative/low investment**	**Aggressive/High investment**
B/M		
S	-0.091	-0.021
B	0.089	0.012
OP		
S	0.069	0.10
B	-0.061	-0.10
Investment		
S	0.61	-0.21
B	0.32	-0.67
	Momentum	
S	-0.0039	0.0028
B	0.0040	-0.0031

Table 5 d: Time-Series Averages of B/M, OP, Inv., and MOM for Portfolios Formed on Size-Mom. portfolios

Size & Momentum Ratio		
Momentum	**loser/lowest Momentum**	**winner/highest Momentum**
B/M		
S	-0.0065	-0.070
B	-0.022	0.078
OP		
S	0.027	0.0011
B	-0.029	-0.0010
Investment		
S	0.0074	-0.015
B	-0.0088	0.014
	Momentum	
S	-0.53	0.55
B	-0.33	0.30

The Table 5 a, b, c and d, offerings the time-series averages of the B/M ratio, profitability, investment, and momentum for portfolios created on each four 4 sort portfolios i.e., size and B/M ratio-OP-Inv.-Mom. The 16 portfolios are created on the above-mentioned procedure to perceive the performance of the stocks or portfolios average mean returns. The Table 5 a, of size-b/m sort portfolios regarding SMB, HML, RMW, CMA and WML found and concluded that the average % age of stocks return in SL portfolios towards SH increases horizontally i.e., -0.063 to 0.063, while the BL towards BH also increases i.e., -0.89 to 0.89It means that horizontally, the small sizes firms are more likely to have a high average %age of high B/M ratio than the small sizes of a low average % age of low B/M ratio, and the big sizes ones have also a high average % age of high B/M. ratio than the big sizes of a low average % age of low B/M ratio. Therefore, the big size and high b/m value is outperformed than the small size and low b/m value portfolios. However, vertically, small size decreases when move towards big size in low b/m portfolios, while the small size increases when move to

towards big size in high b/m portfolios. Similarly, the average % age of stocks returns in small size Weak/Lowest profitability portfolios SW/L towards small robust/Highest profitability SR/H increases horizontally i.e., -0.00011 to 0.00011while, the big size Weak/Lowest profitability portfolios BW/L towards Big robust/Highest profitability BR/H decreases horizontally i.e., 0.00011 to -0.00011. It means that horizontally, the small sizes firms are more likely to have a high average %age of robust/highest profitability than the small sizes of a low average % age of weak/lowest profitability, and the big sizes ones have a high average % age of Weak/Lowest profitability portfolios than the big sizes of a low average % age robust/Highest profitability. Consequently, the small sizes firms with a weak/lowest profitability are less likely to have a low average %age return than a big sizes with weak/lowest profitability, while, the small sizes with robust/highest ones have a high average % age portfolios than the big sizes of a low average % age robust/Highest profitability. Therefore, the small size and robust/highest profitability portfolios is outperformed or more profitable than the big size and weak/low profitability portfolios. Likewise, the average % age of stocks returns in small size Conservative/low investment portfolios SC/L towards small Aggressive/High investment SA/H decreases horizontally i.e., 0.00019 to -0.00019 while, the big size Conservative/low investment portfolios BC/L towards Big size Aggressive/High investment BA/H increases horizontally i.e., -0.00019 to 0.00019. It means that horizontally, the small sizes firms are more likely to have a high average %age of small size Conservative/low investment portfolios SC/L than the small sizes of a low average % age of small Aggressive/High investment SA/H, and the big sizes ones have a high average % age of Aggressive/High investment BA/H than the big sizes of a low average % age of Conservative/low investment portfolios BC/L. Therefore, the big size and conservative/low profitability portfolios is outperformed or more profitable than the small size and aggressive/highest profitability portfolios. Similarly, the average % age of stocks returns in small size loser/lowest Momentum portfolios SL/L towards small size winner/highest Momentum SW/H increases horizontally i.e., -0.00053 to 0.00053, while, the big size Loser/low momentum portfolios BL/L towards Big size winner/High Momentum BW/H decreases horizontally i.e., 0.00053 to -0.00053. It means that horizontally, the small sizes firms are more likely to have a low average %age of small size loser/lowest Momentum portfolios SL/L than the small sizes of a high average % age of small size winner/highest Momentum SW/H, and the big sizes ones have a high average % age of big size Loser/low momentum portfolios BL/L than the big sizes of a low average % age of big size winner/High Momentum BW/H. Therefore, the small size and winner/highest momentum portfolios is outperformed or more profitable than the big size and Loser/low momentum portfolios. The result is expecting and aligned or in lined with the Bereket (2014) and Fama and French (2015). However, not in lined with Benali et al. (2023). The Table 5 b, of size-operating profitability, sort portfolios regarding SMB, HML, RMW, CMA and WML found and concluded that horizontally, in the small size portfolios, the profitability of the stocks in weak portfolios rises towards robust profitability stocks i.e., move from negetive to positive, while, in the big size portfolios, the profitability of the stocks in weak portfolios decreases towards robust profitability stocks, which is not according to theory i.e., move from negetive-to-negetive direction. Tus, it concluded that the size effects of the small size outperformed than the big size profitability. However, vertically, in the small size portfolios, the profitability of the stocks in weak/lowest portfolios increases towards big size stocks, which is not according to theory i.e., move from small to big size, while, in the small size portfolios, the profitability of the stocks in robust portfolios decreases towards big size profitability stocks, which is according to theory i.e., move from small to big size. Thus, it concluded that the robust/ highest value profitability effects outperformed or more profitable than the weak/lowest profitability, it is further found and concluded that the size effects of the big size outperformed or profitable than the small size value profitability. However, the big size and conservative investment return is greater than small size and aggressive investment. Though, the big size and loser/lowest momentum return is greater than small size and winner/highest momentum portfolios. The Table 5 c, of size-investment, sort portfolios regarding SMB, HML, RMW, CMA and WML found and concluded that the small size and aggressive/lowest investment return is greater than the big size and conservative/lowest investment portfolios. Hence, it is found and concluded that the same patterns are observed for the overall four portfolios i.e., B/M, Profitability, investment, momentum ratio portfolios. The Table 5 d, of size-momentum, sort portfolios regarding SMB, HML, RMW, CMA and WML found and concluded that the small size and winner/highest portfolios is outperformed than the big size and loser/lowest momentum portfolios, which shows outperformance of small size and winner/ highest momentum stocks. It further found and concluded that the big size and high b/m value underperformed than the HML avg. The same case is for profitability and investment portfolios as profitability decreases from leftmost column to the right most column, then the investment portfolios also decrease. It further found and concluded that the big size and weak/lowest profitability portfolios is outperformed than the small size and robust momentum portfolios. which means that the big size and weak/lowest profitability portfolios is underperformed than the average. These results support the earlier bits of suggestion only if by Fama and French (2015) & Lin (2017).

5.2. Limitations

The author urged that one of the weaknesses with my research paper is that it in contrast to Cakici et al. (2013), Lin (2017), Leite and Cortez. (2020) and Foye (2018), is not possible to analyze each and every company or

industry's sector within the emerging market independently. Furthermore, it is more difficult to understand the company and industry sector's market characteristics like i.e., homogeneous, or heterogenous, that may affect the results as well. Therefore, the author confirmed and suggests that it is important to compare the results presented in this research paper with results from other studies that have analyzed the emerging markets of the firms, and industries sectors on a regional or country-level. Another weakness the author observed and found that in this sample, we used (2x2) breakpoint and constructed sort of portfolios due to few portfolios available for analysis compared to other studies. This is, most likely, due to there being fewer firms in the emerging markets data which makes it difficult to sort the firms more finely without affecting the diversification of the portfolios, thereby negatively affecting the robustness of the results. The author observed and suggests that the sample size in this research paper is not enough for (5x5) and (2x3) etc. sort of portfolios breakpoints and constructs, because of our sample size is from emerging markets and low liquid. Thus, the author further suggests that we could use (5x5) and (2x3) etc. sort of portfolios breakpoints and constructs for high liquid sample size mostly in developed countries and mostlt in developing countries but in financial sectors companes, like Claesson (2021), suggested that the Prominent studies in asset pricing often use (5x5) or (2x4x4) etc. portfolio sorting schemes which may lead to a deeper understanding of which cross-sections of portfolio returns that different asset pricing models have difficulty explaining. The author durther urged that the strength of my research paper is that it uses data from a comparatively large sample period and used (2x2) sort of breakpoints that the sample is broad as it contains data from 130 non-financial companies, this should add robustness to the results. The non-financial companies that are included in my sample but not in broad sample studies such as Foye (2018) and Cakici et al. (2013). Thus, the author confirmed and concluded that our sample size has the major impact on a value-weighted portfolio as their market capitalizations are comparatively large.

5.3. Theoretical, Practical Implications & Contributions

We addressed previously underexplored dimensions in an emerging markets like Pakistan context and this research contributes to the literature in the field of asset pricing in several ways, such as: To the best of Author's knowledge this study employs simultaneously compares the performance of the proposed FF6FM asset pricing models at (2x2) diversification level of test portfolios. We introduced this style-portfolios, where performance across all portfolios can be compared for consistency in returns of the proposed asset pricing model for the success in explaining the return for each portfolio across full sample period and the periods of extreme economic uncertainty. The study offers an insight into the performance of asset pricing models for an average Pakistani investor who may hold an under-diversified or concentrated portfolio. The research identifies that the asset pricing models are relatively more effective for diversified portfolios than concentrated portfolios and it is challenging to find a model that is effective in explaining the variation in the returns of any portfolio, but there is the possibility of finding a portfolio which works for a model and the investors can maximize their returns with a carefully chosen portfolio based on particular characteristics with a fewer number of stocks. Our study avoids this biasness and excludes the thinly traded illiquid micro stocks and analysis PSX 130 stocks (a float-adjusted index) to get an insight into the models' performance/effectiveness from a practical perspective. This research identifies that the superiority of several asset pricing models, which has been previously documented, is sensitive to the portfolio formation technique and a model which can effectively explain the return of a particular portfolio may be unsuccessful in explaining the returns of a portfolio formed on different characteristics, sorting level or diversification level. Although this study which compares the performance of asset pricing models during the different phases of market cycle in between July, 2014 to June, 2019. This research identifies that the effectiveness of asset pricing models is also sensitive to market conditions, and surprisingly the asset pricing models performed better during the good and bad conditioned period and captured the variation in the portfolio returns more effectively for relatively shorter horizons with help of error correction term (ECT-1) e.g., the sample period broken down in sub-sample periods, as stock markets are dynamic in nature and some anomalies do not exist in the long horizons, disequilibrium and become redundant over time in the long run period.

5.4. Recommendations & Future Research Directions and Actions

As the results indicate that all the proposed models of Asset Paring Model like FF6FM perform well. The author, observed, confirmed, and further suggests that the future researchers should convert weaknesses into streanth (as mentioned above in section, 4.7.3, a, in limitations) to constructing a sample size solely including, large representatives' sample size, using for a larger sample period for firms, industries, sectors, regional and country's level as well. In addition, the future research in the emerging markets should analyze the performance of asset pricing models using different portfolios sorted on other factor combinations like (5x5) or (2x4x4) and (2x3) etc. or anomalies. The author suggests that to examine validity, reality and evaluate the performance of several different asset pricing models, including the CAPM, FF3FM, FF4FM, Five-factor model, Six-factor model and seven factor Models. A similar analysis should be carried out but in different style of investment strategy, methodology and tools in the emerging markets as this would further test the robustness of the Fama-French risk premium factors models and perhaps give insight into other factors or models like behavioral and macro environmental factors that from the perspective of the emerging markets, may be viable alternatives.

Finally, the GRS F-test - which lies at the center of the methodologies should applied in the asset pricing literature to evaluate the model performance. The Author further suggests that the GRS F-statistic, when applied using locally constructed factors, is robust as the significance level of the GRS F-Statistic. Thus, the future research may implement this robustness check to further increase the reliability and validity of the results.

References

Aurangzeb, A. Z. (2003). Relationship between health expenditure and GDP in an augmented Solow growth model for Pakistan: An application of co-integration and error-correction modeling. *Lahore Journal of Economics*, *8*(2), 1-16.

Avramov, D., & Chordia, T. (2006). Predicting stock returns. *Journal of Financial Economics, 82*(2), 387-415.

Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of financial economics, 9*(1), 3-18.

Bektić, D., Wenzler, J. S., Wegener, M., Schiereck, D., & Spielmann, T. (2019). Extending Fama–French factors to corporate bond markets. *The Journal of Portfolio Management, 45*(3), 141-158.

Benali, M., Lahboub, K., & El Bouhadi, A. (2023). Pricing Ability of Carhart Four-Factor and Fama–French Three-Factor Models: Empirical Evidence from Morocco. *International Journal of Financial Studies*, *11*(1), 20.

Bereket, T. (2014). *The validity of Fama-French four factor model in Istanbul stock exchange* (Master's thesis, Middle East Technical University).

Blazenko, G. W., & Fu, Y. (2013). Value versus growth in dynamic equity investing. Managerial Finance, 39(3), 272-305.

Bodie, J. R. (2001). Stream and riparian management for freshwater turtles. Journal of environmental management, 62(4), 443-455.

Cakici, N., Fabozzi, F. J., & Tan, S. (2013). Size, value, and momentum in emerging market stock returns. Emerging Markets Review, 16, 46-65.

Chai, D., Chiah, M., & Zhong, A. (2019). Choosing factors: Australian evidence. *Pacific-Basin Finance Journal, 58*, 101223.

Chan, K. C., & Chen, N. F. (1991). Structural and return characteristics of small and large firms. The journal of finance, 46(4), 1467-1484.

Chan, W. H., & Feng, L. (2008). Extreme news events, long-memory volatility, and time varying risk premia in stock market returns. Long-Memory Volatility, and Time Varying Risk Premia in Stock Market Returns (July 23, 2008).

Claesson, H. (2021). The Fama-French Asset Pricing Models: Emerging Markets.

Diallo, B., Bagudu, A., & Zhang, Q. (2019). A Machine Learning Approach to the Fama-French Three-and Five-Factor Models. *Available at SSRN 3440840*.

Doğan, M., Kevser, M., & Leyli Demirel, B. (2022). Testing the Augmented Fama–French Six-Factor Asset Pricing Model with Momentum Factor for Borsa Istanbul. *Discrete Dynamics in Nature and Society*, *2022*.

El Abd, R. A. E. M. A. (2016). Determinants of stock returns: Evidence from Egypt.

Fama, E. F. (2014). Two pillars of asset pricing. *American Economic Review*, *104*(6), 1467-1485.

Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. the Journal of Finance, 47(2), 427-465.

Fama, E. F., & French, K. R. (1996). Multifactor explanations of asset pricing anomalies. The journal of finance, 51(1), 55-84.

Fama, E. F., & French, K. R. (1998). Value versus growth: The international evidence. The journal of finance, 53(6), 1975-1999.

Fama, E. F., & French, K. R. (2011). Size, value, and momentum in international stock returns. *Fama-Miller Working Paper, Tuck School of Business Working Paper*, (2011-85), 11-10.

Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. Journal of financial economics, 116(1), 1-22.

Fama, E. F., & French, K. R. (2017). Choosing factors. Fama-Miller Working Paper, Tuck School of Business Working Paper, (2668236), 16-17.

Fama, E. F., & French, K. R. (2018). Choosing factors. Journal of financial economics, 128(2), 234-252.

Ferezagia, D. V. (2018). Error Correction Model: Application to Insurance Assets in Indonesia. Global Journal of Pure and Applied Mathematics, 14(6), 827-832.

Foye, J. (2018). A comprehensive test of the Fama-French five-factor model in emerging markets. Emerging Markets Review, 37, 199-222.

Fua, Y., & Blazenko, G. W. (2014). Equity Allocation Without Estimation Risk.

Haqqani, K., & Aleem, M. (2020). Testing liquidity augmented Fama-French five-factor model in Pakistan stock exchange. Global Economics Review, 255, 65.

Harvey, C. R. (2001). Asset pricing in emerging markets. International encyclopedia of the social and behavioral sciences, 840-845.

Hoang, L. T., & Phan, T. T. (2019). Is liquidity priced in the Vietnamese stock market?. Economic Papers: A journal of applied economics and policy, 38(3), 193-207.

Hou, K., Mo, H., Xue, C., & Zhang, L. (2021). An augmented q-factor model with expected growth. Review of Finance, 25(1), 1-41.

Hou, K., Xue, C., & Zhang, L. (2015). Digesting anomalies: An investment approach. The Review of Financial Studies, 28(3), 650-705.

Iqbal, A., Ali, A., & D'Abreo, P. X. (2017). Fama And French Three Factor Model Application In The Pakistan Stock Exchange (Pse). IBT Journal of Business Studies (JBS), 1(1).

Ishtiaq, M., Tufail, M. S., Muneer, S., & Sarwar, M. B. (2019). Application of Fama-French Five Factor Model in Stock Pricing: Evidence from Emerging Market. Pacific Business Review International, 11(7), 73-95.

Jegadeesh, N., & Titman, S. (1993). Returns to buying winners and selling losers: Implications for stock market efficiency. The Journal of finance, 48(1), 65-91.

Kim, C. J., Morley, J. C., & Nelson, C. R. (2004). Is there a positive relationship between stock market volatility and the equity premium?. Journal of Money, Credit and banking, 339-360.

Kim, D. (1997). A reexamination of firm size, book-to-market, and earnings price in the cross-section of expected stock returns. Journal of Financial and Quantitative Analysis, 32(4), 463-489.

Kumar, S. (2023). Exploratory review of esg factor attribution to the portfolio return in Fama-French factor model framework. Academy of Marketing Studies Journal, 27, 1-20.

Leite, A. L., Klotzle, M. C., Pinto, A. C. F., & da Silva, A. F. (2018). Size, value, profitability, and investment: Evidence from emerging markets. *Emerging Markets Review*, *36*, 45-59.

Leite, P., & Cortez, M. C. (2020). Investment and profitability factors in mutual fund performance evaluation: a conditional approach. Applied Economics Letters, 27(16), 1312-1315.

Lin, Q. (2017). Noisy prices and the Fama–French five-factor asset pricing model in China. Emerging Markets Review, 31, 141-163.

Lohano, K., & Kashif, M. (2019). Testing asset pricing models on the Pakistan Stock Exchange. Business Review, 13(2), 1-19.

Markowitz, H. (1952). Portfolio selection. The Journal of Finance, 7(1), 77–91.

Mosoeu, S., & Kodongo, O. (2022). The Fama-French five-factor model and emerging market equity returns. The Quarterly Review of Economics and Finance, 85, 55-76.

Musawa, N., Kapena, S., & Shikaputo, C. (2018). A comparative analysis of Fama-French Five and Three-Factor model in explaining stock returns variation. *International Journal of Economics*, *3*(1), 30-48.

Nahzat Abbas, J. K., Aziz, R., & Sumrani, Z. (2015). A study to check the applicability of fama and french, Three-Factor model on KSE 100-Index from 2004-2014. *International Journal of Financial Research*, *6*(1), 90-100.

Nartea, G. V., Ward, B. D., & Djajadikerta, H. G. (2009). Size, BM, and momentum effects and the robustness of the Fama-French three-factor model: Evidence from New Zealand. *International Journal of Managerial Finance*, *5*(2), 179-200.

Ozkan, N. (2018). Fama-french five factor model and the necessity 0f value factor: Evidence from Istanbul stock exchange. PressAcademia Procedia, 8(1), 14-17.

Perold, A. F. (2004). The capital asset pricing model. Journal of economic perspectives, 18(3), 3-24.

Qasim, M. (2018). Determining stock market return by using multiple factor model during boom and burst in oil Market.

Saunders, M., Lewis, P. H. I. L. I. P., & Thornhill, A. D. R. I. A. N. (2012). Research methods. *Business Students 4th edition Pearson Education Limited, England*, *6*(3), 1-268.

Sharif, N., Ahmad, N., & Ali, T. Y. (2018). Determining Share Price: An Empirical Evidence from PSX. Pakistan Journal of Engineering, Technology & Science, 7(2).

Taha, R., & Elgiziry, K. (2016). A five-factor asset pricing model: empirical evidence from Egypt. International Journal of Business, 21(4), 342.

Verma, R. (2011). Testing forecasting power of the conditional relationship between beta and return. The Journal of Risk Finance, 12(1), 69-77.

Zaremba, A., & Konieczka, P. (2015). Paper profits from value, size and momentum: evidence from the Polish market. Financial Internet Quarterly, 11(3), 58-69.

Zhang, Q., Saqib, Z. A., Saqib, K. A., Mahmood, S., & Cao, M. (2019, July). Alternative Three Factor Model for Asset Pricing for the Investment, Market and Profitability Premium in Emerging Markets: An Evidence from Pakistan's Stock Exchange. In *2019 16th International Conference on Service Systems and Service Management (ICSSSM)* (pp. 1-6). IEEE.