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Fama and French (2015) five-factor Model with Mediating Role of Consumer Confidence: Evidence from Non-financial Sectors of Pakistan

Mohammad Azam *

Abstract: *Using a sizable sample of data from the Pakistan Stock Exchange, the study explores the relationship between five risk indicators and portfolio stock returns as well as the mediating function of consumer confidence. The analysis is based on a five-factor model developed by Fama and French (2015) that incorporates time-series ordinary least square regression and structural equation modelling approaches. Market estimates show a statistically significant relationship with portfolio excess returns in terms of size, value, profitability, and investment risk-premia. Nevertheless, Consumer Confidence, a mediating and independent variable in Pakistani non-financial firms, is insignificant in capturing the variation of portfolio returns.*

Keywords: Fama & French five-factor model, Asset pricing, Consumer Confidence, Structural Equation Modelling, Pakistan Stock Exchange.

Introduction

Stock markets are performing a dynamic role in the economy of a country. The paradox of evaluating the stock returns is an intricate phenomenon which is vital for understanding the rational investment decisions in the stock markets. In fact, no one can deny that stock markets are playing a dynamic role in the economy of a country. Therefore, researchers and investors strive hard to develop strategies for forecasting expected returns using numerous sophisticated asset pricing models (henceforth APMs). As a result, before making investment decisions in stock markets, the most volatile segment of the capital market, investors and portfolio managers are driven by the APMs to make the best possible choices.

The first investigation into this conundrum was conducted when Markowitz (1952) pioneered the risk-returns nexus which later on accumulated in the shape of the Capital Asset Pricing Model (henceforth CAPM). Markowitz (1952) contributed, on the basis of variances of return and expected return, the selection of portfolio and pointed out the mean-variance efficiency as an optimal portfolio which holds the maximum probable returns at a specified level of risk. In case investors have homogeneous expectations in terms of expected returns so it would be an efficient market portfolio which would be the total of all optimal portfolios (Sharpe, 1964). Due to its simplicity, CAPM is the most commonly

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used asset pricing model. In choosing portfolios, investors prefer the mean-variance criterion presented by Markowitz. It is developed independently by Sharpe (1964); Lintner (1965); Mossin (1966) is the first asset pricing model (henceforth APM) for predicting the value of an asset based on systematic risk. It is the arranged form of continuous independent contribution of Markowitz, Sharpe, Lintner, in different time periods. It is a financial model used to determine the expected return of a stock, given its level of risk. It is based on the premise that investors require a higher return on stock that are more risky, and that the risk of stock can be measured by its beta. Beta is a measure of the volatility of stock returns proportionate to the overall market. The use of beta has had powerful impact, not only on the academic but also on financial and investment community.

The CAPM has been criticised by numerous perspectives particularly its assumptions such as one limitation of the CAPM is that it assumes that investors are risk-averse and will only invest in assets that provide a higher expected return for higher levels of risk. In reality, investor behavior may not always conform to this assumption. In response, the (Fama & French, 1993) three-factor model (henceforth FF3FM) has been introduced by augmenting two additional factors such as size and value. It is widely used as a benchmarked APM in academic research and has had a significant contribution on the field of finance in explaining the cross-section of stock returns. It has proposed that stock or portfolio returns can be explained by three factors: the market factor, the size factor, and the value factor. Later on, the Fama and French (2015) five-factor model (henceforth FF5FM) has introduced an alternative asset pricing model which is an extension of FF3FM by augmenting two additional factors: the profitability factor and the investment factor which has also been widely used in academic research and has had a significant impact on the field of finance to explain the cross-section of stock returns. It has been found to be a useful tool for understanding the factors that drive stock returns and for constructing portfolios that outperform the market.

The FF5FM is a financial model which aims to explain the return on investment (ROI) of a stock or portfolio in terms of five risk-factors: market beta, size, value, profitability, and investment. These five factors are believed to capture the majority of the variation in stock or portfolio returns, and can be used to build portfolios that outperform the overall market. The market beta factor determines how responsive stock or portfolio returns are to variations in the overall market. A stock having beta equal to 1 refers to move in line with the market though greater than 1 refers higher volatile than the market. Conversely, less than 1 refers to be less volatile. The size factor captures the tendency for smaller firms to outperform bigger firms. The value factor captures the tendency for stocks having lower B—M ratios to outperform stocks having higher B—M ratios. The profitability factor captures the tendency for stocks with higher profitability (as measured by return on assets) to outperform stocks with lower profitability. Finally, the investment factor captures the tendency for stocks with high levels of investment (as measured by capital expenditure) to underperform stocks with low levels of investment. The profitability factor captures the excess return of stocks with high profitability relative to those with low profitability, while the investment factor captures the excess return of stocks with low investment relative to those with high investment.

In general, the FF5FM is used by financial analysts and investors to understand the

sources of risk and return in the stock market and to inform portfolio construction decisions. It is based on the idea that the cross-section of stock returns is determined by a combination of these five factors, which can help to explain the variances in returns between individual stocks and the overall market. The FF5FM is a modification of the traditional three-factor model proposed by Fama and French (2015). It adds two additional factors to the previous three-factor model, which were designed to explain the empirical anomalies that the original model could not fully account for.

Risk-Factors Measurement

The five factors in the Fama-French model consist of market-risk, size risk, value risk, profitability risk and investment risk which are measured as follows:

Table 1
Risk-Factors Measurement

Risk-factor	Measurement
Market (RmRf)	The Market risk factor captures the risk associated with investing in the overall market. It is measured by the return of the market portfolio.
Size (SMB)	The Size risk factor captures the risk associated with investing in small-cap stocks. It is measured by the portfolio returns of small-cap stocks minus the portfolio returns of big-cap stocks.
Value (HML)	The Value risk factor captures the risk associated with investing in value stocks (stocks that are considered to be undervalued based on certain financial metrics). It is measured by the portfolio returns of value stocks minus the portfolio returns of growth stocks (stocks that are expected to grow at a faster rate than the overall market).
Profitability (RMW)	The Profitability risk factor captures the risk associated with investing in stocks with high profitability (as measured by the return on assets-ROA). It is measured by the portfolio returns with high profitability minus the portfolio returns with low profitability.
Investment (CMA)	The Investment risk factor captures the risk associated with investing in stocks with high levels of investment (as measured by the capital expenditure to assets ratio). It is measured by the portfolio returns with high levels of investment minus the portfolio returns with low levels of investment.

Notes: Table 1 presents the Fama-French five risk-factors and its measurements. These risk-factors can be presented in acronyms as (MSVPI) which are used as independent variables.

Overall, the FF5FM is used to explain the returns of individual stocks or portfolios in the context of the overall market and various risk factors. It is widely used in the field of finance for research and investment management purposes. Therefore, this study compares, using data from the Pakistan stock exchanges and multifactor asset pricing models, which risk factor significantly influences investment decisions.

Contribution of the Study

This study pioneered the use of Structural Equation Modeling in Pakistan Stock Exchange, investigating the Fama-French five-factor model with Consumer Confidence Index as mediating variable, as well as the time-series OLS Regression technique using Consumer Confidence Index augmented Fama-French five-factor model between January 2012 and June 2022 using a large sample of 280 non-financial enlisted firms. As previous literature suggests that there is a strong nexus between consumer confidence and stock returns

(Fisher & Statman, 2003; Chen, 2011). When consumer confidence is high, investors are more likely to invest in stocks, which can lead to higher stock returns (Sum et al., 2014). Conversely, when consumer confidence is low, investors may become more risk-averse, leading to lower stock returns. Therefore, when consumer confidence is increasing, it can be seen as a sign of increased investor confidence, which can lead to higher stock returns. Responding to the arguments, this study is the first to conduct an empirical study that demonstrates an innovative notion of Consumer Confidence Index as mediating variable into asset pricing models (APMs) that influences the investors' behaviour that is interconnected with capital markets, thus it mediates the nexus between risk premiums and portfolio returns using a thoroughly tested asset pricing models such as Fama and French (2015) five-factor model, with Consumer Confidence Index as a mediating variable to develop a novel application of a theoretical paradigm into the practical and empirical world Furthermore, the study focuses on a large non-financial sample from emerging markets and employs Structural Equation Modeling, which has never been used in this field before and is seen as an innovation in this field. Before making decisions on the Pakistan Stock Exchange, investors and portfolio managers can use the study's findings to construct diversified portfolios.

Literature Review

In every market, particularly the stock market, hyperconscious investors attempt to maximise profits while assuming the minimum amount of risk. As a result, modern investment theories give risk and return management tools and approaches to help investors manage their portfolios effectively in order to achieve their intended goals in the form of capital gain with a desirable amount of risk. To that purpose, various asset pricing models (APMs) have been developed for use in selecting and allocating diverse equities in order to minimise the associated risk.

Asset pricing models are mathematical models used to price different types of financial assets, such as stocks, bonds, derivatives, and other investments. These models attempt to determine a fair value for the asset based on a variety of factors, such as current market conditions, expected future cash flows, risk and volatility, and the impact of inflation, and interest rates. However, the traditional finance theory seeks to explain financial markets using asset pricing models that presumptively represent rational investors (Solanki & Seetharam, 2014). It is still elusive what causes cross-sectional volatility in forecasted stock returns despite decades of study (Annaert, De Ceuster, & Verstegen, 2013).

The behaviour of stock returns is fundamental to every investment management decisions. Investors who are interested to invest are hyperconscious about the valuation of stocks. In order to get optimal return in the shape of potential capital gain, investors are interested to have the best tools and techniques to evaluate the asset properly. For this purpose, here are different models and theories that have evolved in the literature considering appropriate and acceptable risk and return combination. The dual risk and return aspect of an asset was first developed, as an approach, by Markowitz (1952). It assists an investor in achieving the optimal portfolio position which prescribes the decision of a

rational investor. In response, the Capital Asset Pricing Model (CAPM) was developed by William Sharpe, describing the relationship between risk and return and quantifying it for the first time. It says that an investor expects risk premium from holding an investment .

In the same vein, the CAPM provides a better risk-return nexus. Sharpe (1964); Lintner (1965) developed CAPM by expanding on Markowitz (1952) prior work. According to Markowitz theory, the CAPM posits that investors only examine the variance and average of any asset's returns. Following Markowitz theory, their approach posits that the relevant risk of any asset is the risk that cannot be diversified or mitigated in a portfolio. As a result, it assumes a linear nexus between an asset's returns and risk. It defines asset risk as the variability of asset returns in comparison to the returns of a well-diversified portfolio, such as market portfolio. Black, Jensen, Scholes, et al. (1972) were the first to report substantial empirical support for the validity of CAPM in stock markets. CAPM has been upgraded with multiple anomalies such as size, value, and so on, which has been upgraded into another model known as Fama and French (1993) three-factor model that produced better results in explaining stock returns and was considered the benchmark APM. It was then augmented with the momentum factor known as the Carhart (1997) four-factor model, which also provided a new cornucopia of research advancement. Following that, Fama and French (2015) five-factor model claimed that it was the most complete model for determining the link between risk and return, but due to its novelty and sometimes complexity, its usage in experimental investigations is quite restricted.

The Fama and French (2015) five factor model is an asset pricing model that is based on the CAPM. The five factors of the model are market risk, size, value, profitability and investment. The model states that the expected return of an asset is a function of the five factors. Market risk is the risk associated with the overall market and is measured using the market beta. Size is the size of the company and is measured using the market capitalization. Value measures the undervaluation or overvaluation of a stock and is measured using the book-to-market ratio. Profitability measures the profitability of a company and is measured using the profitability index. Investment measures the level of investment in the company and is measured using the investment factor. The Fama and French (2015) five factor model is widely used by asset managers and investors to value stocks and to make investment decisions such as, Ali, Khurram, and Jiang (2021) examined various nested APMs using PSX data and revealed that FF5FM outperformed other models and also supported by GRS test. Azam et al. (2021) investigated liquidity and momentum augmented FF5FM and evidenced statistically significant contribution in explaining the portfolio returns in PSX. Another study conducted on PSX, Azam et al. (2022) observed significant market risk-factor which supports the CAPM in PSX. Based on the above risk-factors studies, this study examines the more recently empirically investigated model FF5FM along with mediating variable of Consumer Confidence Index to contribute to the body of literature using PSX non-financial data.

The additional portion to the risk-free asset for bearing risk is the risk premium an investor expects from an investment. Treasury bill rate is considered as the risk-free rate. In other words, risk premium is the return an investor expects from an investment, for the holding period in excess of the risk-free rate of return.

Data and Model Specification

The study uses sample of 280 non-financial firms monthly data enlisted on PSX. The monthly data is used for time-span between January 2012 and June 2022 using 6 equal-weighted portfolios from PSX. The financial statements and Consumer Confidence Index data is retrieved from State Bank of Pakistan official website while monthly stock prices from Pakistan Stock Exchange official website .

Model Specification

This study also uses the following CCI augmented FF5FM (CC-FF5FM) specification:

$$R_i - R_f = R_f + \beta_m(R_m - R_f) + \beta_s(SmB) + \beta_v(HmL) + \beta_p(RmW) + \beta_i(CmA) + \beta_g(CCI) + \epsilon_i \quad (1)$$

Where, $R_i - R_f$, is excess returns of portfolio $R_m - R_f$, is the excess returns of market SmB is the Small minus Big firms returns called Size factor HmL is the High minus Low firms returns called Value factor RMW is the Robust minus Weak firms returns called Profitability factor CMA is the Conservative minus Aggressive firms returns called Investment factor CCI is the Consumer Confidence Index $\beta_m, \beta_s, \beta_v, \beta_p, \beta_i$ and β_c are the coefficients of market, size, value, profitability, investment factors and Consumer Confidence Index respectively.

The graphical presentation of risk-factors

The Fama and French (2015) five-factors are presented in the graphical presentation. Using monthly data, Fig 1 graphically depicts the risk-factors (five-factors) for the sample period from January 2012 to June 2022. The market returns clearly show the fluctuations caused by Covid-19, and the profitability factor also shows volatility in the graph over the sample time-span.

Theoretical Framework

Fig 2 represents the Structural Equation Modeling using Fama and French (2015) five-factor model with Consumer Confidence Index as mediating variable impact on six-excess portfolio returns in PSX. The study investigates the theoretical framework.

The study looks at the direct relationship between five risk factors and six portfolio returns, as well as the indirect relationship using the consumer confidence index (CCI) as a mediating variable to see if CCI influences the direct relationship using Structural Equation Modeling on PSX as presented in Fig 2.

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Figure 1
The graphical presentation of risk-factors (Jan 2012 to Jun 2022)

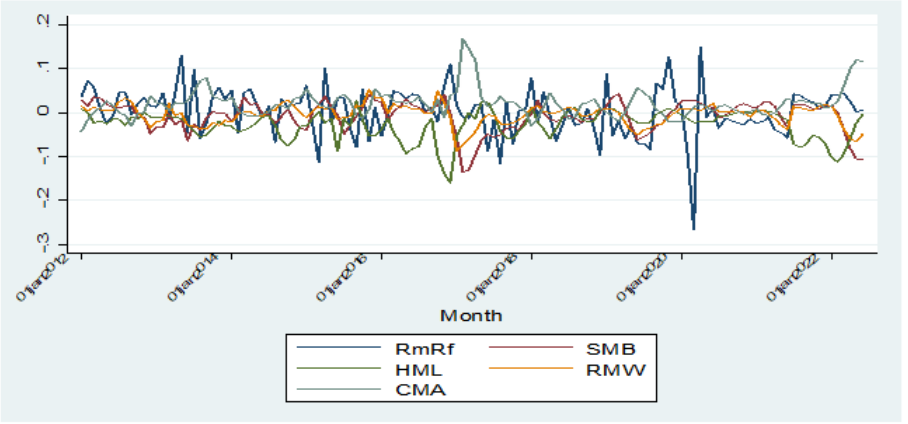
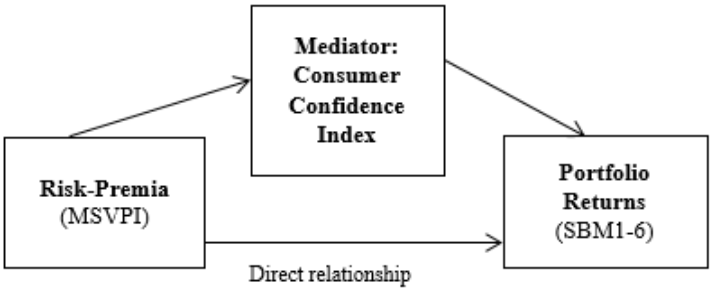


Figure 2
Theoretical Framework of the study



Descriptive Statistics and Correlation Matrix

The SEM is used for econometrics analysis and the following results were observed. The descriptive statistics and correlation matrix is presented in table 2. As shown the size, value and profitability show negative mean returns with standard deviation of 0.0343, 0.0325, and 0.0235 respectively while market, investment and Consumer Confidence Index show positive mean returns with standard deviation of 0.0555, 0.0321 and 0.1518 respectively for the time-span. However, the strongest adverse connection is revealed between size and investment (-0.2758), whereas the most positive correlation is exhibited between size and profitability (0.1784) showing no multicollinearity in the independent variables.

Table 2
Descriptive Statistics and Correlation Matrix

Variable	RmRf	SMB	HML	RMW	CMA	CCI
Mean	0.0033	-0.008	-0.0279	-0.0044	0.021	3.7384
Std. Dev.	0.0555	0.0343	0.0325	0.0235	0.0321	0.1518
Max	0.1494	0.042	0.0266	0.0518	0.1678	4.0248
Min	-0.2668	-0.135	-0.1597	-0.0883	-0.042	3.3593
Obs.	126	126	126	126	126	126
Variable	**RmRf**	**SMB**	**HML**	**RMW**	**CMA**	**CCI**
RmRf	1	0.0855	-0.2221	0.0443	-0.0564	-0.1916
SMB	0.0855	1	-0.1141	0.1784	-0.2758	-0.127
HML	-0.2221	-0.1141	1	-0.0935	-0.233	-0.101
RMW	0.0443	0.1784	-0.0935	1	-0.1641	-0.0613
CMA	-0.0564	-0.2758	-0.233	-0.1641	1	0.1671
CCI	-0.1916	-0.127	-0.101	-0.0613	0.1671	1

Notes: Table 2 displays the descriptive statistics for risk-factors and mediating variable. The second portion shows correlation matrix between independent risk-factors.

Empirical Analysis

The study uses Structural Equation Modeling using Consumer Confidence Index as mediator to examine whether CCI mediates the nexus between portfolio returns (Endogenous variables) and Fama and French (2015) five risk-factors (exogenous variables) in PSX. After employing the model specification we get the following results:

Portfolio Construction

The study uses 6 equally-weighted portfolios, constructed based on Size and B—M ratio as suggested by Fama and French (1993, 2015) using the following matrix:

Table 3
Portfolio Construction Matrix

Size \ Value	Low	Med	High
Big	BL	BM	BH
Small	SL	SM	SH

Table 3 presents the six-portfolios including BH, BM, BL, SH, SM and SL which denotes the big market-cap firms and high B—M ratio portfolio, similarly big and medium, big and small portfolios. Similarly, the second row presents the small market-cap and high B—M ratio portfolio, small and medium, and small and low portfolios.

The portfolio construction matrix is shown in Table 3. First, all firms are divided into two equal groups, small and large firms, based on market capitalization. Second, both groups are further classified as high, medium, and low based on book-to-market (B—M) ratios, yielding six equally weighted portfolios as suggested by Fama and French (1993, 2015).

Structural Equation Modeling Results

Using SEM technique, we use the BH, BM, BL, SH, SM and SL endogenous variables along with CCI as mediating variable while the RmRf SMB HML RMW CMA are used as exogenous variables. The following results demonstrate the overall findings:

Table 4 demonstrates the findings of SEM estimates based on FF5FM. In first portion of analysis, the study uses the BH portfolio as dependent variable. The results indicate that market, value and profitability demonstrate statistically significant nexus with portfolio returns whereas the size and investment exhibits statistically insignificant results. The mediating variable shows statistically insignificant nexus with portfolio returns in PSX. However, in second portion of analysis, the study uses the BM portfolio as dependent variable. The results indicate that size, value, profitability and investment demonstrate statistically significant nexus with portfolio returns whereas the market exhibits statistically insignificant results. The mediating variable also shows statistically insignificant nexus with portfolio returns in PSX.

In third portion of analysis, the study uses the BL portfolio as dependent variable. The results indicate that market, size, value, profitability and investment demonstrate statistically significant nexus with portfolio returns. The mediating variable shows statistically insignificant nexus with portfolio returns in PSX. However, in fourth portion of analysis, the study uses the SH portfolio as dependent variable. The results indicate that size, value, and profitability demonstrate statistically significant nexus with portfolio returns whereas market and investment exhibit statistically insignificant results. The mediating variable also demonstrates statistically insignificant nexus with portfolio returns in PSX.

In fifth portion of analysis, the study uses the SM portfolio as dependent variable. Similar to fourth portion, the results indicate that size, value, and profitability demonstrate statistically significant nexus with portfolio returns whereas market and investment exhibit statistically insignificant results. The mediating variable also demonstrates statistically insignificant nexus with portfolio returns in PSX. Moreover, in sixth portion of analysis, the study uses the SL portfolio as dependent variable. The results indicate that market, size, value, profitability and investment demonstrate statistically significant nexus with portfolio returns. Though, the mediating variable demonstrates statistically insignificant nexus with portfolio returns in PSX.

In the final portion of analysis, the study uses the CCI as dependent variable. The results indicate that only market demonstrates statistically significant nexus with portfolio returns whereas the others such as size, value, profitability and investment exhibit insignificant nexus with consumer confidence index. Though, the results indicate that mediating variable demonstrates statistically insignificant and having weak impact between portfolio returns and risk-factors in PSX. Moreover, the overall results demonstrate that consumer confidence index is failed to mediate its role between portfolio returns and risk-factors in PSX.

Table 4
SEM with mediation of CCI Estimates:

			OIM			
Structural	**Coef.**	**Std. Err.**	**z**	**P>z**	**[95% Conf.**	
BH <-						
CCI	-0.00037	0.00045	-0.83	0.406	-0.00125	0.00050
RmRf	-0.11606	0.05036	-2.30	0.021	-0.21475	-0.01736
SMB	0.27944	0.15748	1.77	0.076	-0.02922	0.58810
HML	1.07433	0.09779	10.99	0.000	0.88267	1.26600
RMW	-0.62010	0.18377	-3.37	0.001	-0.98028	-0.25991
CMA	0.26266	0.14771	1.78	0.075	-0.02684	0.55216
_cons	0.05383	0.01892	2.85	0.004	0.01676	0.09091
BM <-						
CCI	-0.00038	0.00048	-0.79	0.429	-0.00132	0.00056
RmRf	-0.07050	0.05398	-1.31	0.192	-0.17630	0.03530
SMB	0.99828	0.16881	5.91	0.000	0.66742	1.32915
HML	1.75721	0.10483	16.76	0.000	1.55176	1.96267
RMW	-0.68550	0.19699	-3.48	0.001	-1.07160	-0.29940
CMA	0.71731	0.15833	4.53	0.000	0.40698	1.02764
_cons	0.04735	0.02028	2.34	0.020	0.00761	0.08710
BL <-						
CCI	-0.00029	0.00053	-0.56	0.578	-0.00132	0.00074
RmRf	-0.13629	0.05922	-2.30	0.021	-0.25237	-0.02021
SMB	1.46907	0.18522	7.93	0.000	1.10605	1.83208
HML	1.35177	0.11501	11.75	0.000	1.12635	1.57718
RMW	-1.19488	0.21613	-5.53	0.000	-1.61849	-0.77126
CMA	0.75367	0.17372	4.34	0.000	0.41319	1.09416
_cons	0.05200	0.02225	2.34	0.019	0.00840	0.09561
SH <-						
CCI	-0.00034	0.00047	-0.72	0.473	-0.00125	0.00058
RmRf	-0.09417	0.05269	-1.79	0.074	-0.19744	0.00909
SMB	0.92352	0.16477	5.60	0.000	0.60057	1.24647
HML	1.45693	0.10232	14.24	0.000	1.25639	1.65746
RMW	-2.31507	0.19228	-12.04	0.000	-2.69193	-1.93822
CMA	0.07172	0.15454	0.46	0.643	-0.23118	0.37462
_cons	0.04959	0.01979	2.51	0.012	0.01080	0.08839
SM <-						
CCI	-0.00021	0.00052	-0.41	0.684	-0.00124	0.00081
RmRf	-0.10099	0.05900	-1.71	0.087	-0.21662	0.01465
SMB	0.79375	0.18451	4.30	0.000	0.43211	1.15539
HML	1.04214	0.11458	9.10	0.000	0.81758	1.26670
RMW	-1.01458	0.21532	-4.71	0.000	-1.43659	-0.59257
CMA	0.26145	0.17306	1.51	0.131	-0.07774	0.60064
_cons	0.04959	0.02216	2.24	0.025	0.00615	0.09303
SL <-						
CCI	-0.00029	0.00048	-0.61	0.543	-0.00123	0.00065
RmRf	-0.11784	0.05417	-2.18	0.030	-0.22402	-0.01167
SMB	0.84876	0.16942	5.01	0.000	0.51670	1.18081
HML	1.15664	0.10520	10.99	0.000	0.95045	1.36283
RMW	-0.94464	0.19770	-4.78	0.000	-1.33212	-0.55716
CMA	-0.57387	0.15890	-3.61	0.000	-0.88531	-0.26243
_cons	0.05184	0.02035	2.55	0.011	0.01195	0.09172
CCI <-						
RmRf	-22.85871	9.82865	-2.33	0.020	-42.12250	-3.59492
SMB	-26.19921	31.30353	-0.84	0.403	-87.55300	35.15457
HML	-23.26969	19.38146	-1.20	0.230	-61.25665	14.71727
RMW	30.49495	36.52950	0.83	0.404	-41.10155	102.09140
CMA	16.11886	29.40662	0.55	0.584	-41.51705	73.75477
_cons	41.50616	0.73803	56.24	0.000	40.05965	42.95268
var(e.SL)	0.0010115	0.0001274			0.0007902	0.0012948
var(e.CCI)	34.72476	4.374908			27.12676	44.4509

The primary goal of the research is to determine whether portfolios built on Market-cap and Value-Growth as suggested (Fama & French, 1993, 2015) produce substantial abnormal returns for PSX investors. In compliance with this, the FF5FM is augmented with consumer confidence index to contribute to the body of literature using time-series OLS regression.

Time Series OLS Regression Estimates

For further analysis, the study regress the time-series OLS regression mentioned in equation (1) and observed the following estimates:

Table 5
Time Series OLS Regression Results

VARIABLES	BH	BM	BL	SH	SM	SL
RmRf	-0.116**	-0.071	-0.136**	-0.094*	-0.101*	-0.118**
	-2.24	-1.269	-2.236	-1.737	-1.663	-2.114
SMB	0.279*	0.998***	1.469***	0.924***	0.794***	0.849***
	-1.724	-5.747	-7.708	-5.447	-4.181	-4.869
HML	1.074***	1.757***	1.352***	1.457***	1.042***	1.157***
	-10.677	-16.291	-11.422	-13.838	-8.839	-10.685
RMW	-0.620***	-0.686***	-1.195***	-2.315***	-1.015***	-0.945***
	-3.279	-3.382	-5.373	-11.701	-4.579	-4.644
CMA	0.263*	0.717***	0.754***	0.072	0.261	-0.574***
	-1.728	-4.403	-4.216	-0.451	-1.468	-3.51
CCI	0.000	0.000	0.000	0.000	0.000	0.000
	-0.808	-0.769	-0.54	-0.697	-0.395	-0.59
Constant	0.054***	0.047**	0.052**	0.050**	0.050**	0.052**
	-2.766	-2.269	-2.271	-2.435	-2.174	-2.475
Obs.	126	126	126	126	126	126
R-2	0.622	0.74	0.63	0.798	0.526	0.73

Notes: t-statistics in parentheses with *** p<0.01, ** p<0.05, * p<0.1. The results show coefficients for all six risk-premia and portfolios using OLS regression techniques.

Table 5 demonstrates the factor-loadings with t-statistics using time-series OLS regression estimates based on six equally-weighted portfolios employing consumer confidence index augmented Fama and French (2015) five-factor model (CC-FF5FM) in PSX. The estimates of market, size, value, profitability and investment risk-premia exhibit statistically significant nexus with portfolio excess returns which is consistent with the findings of (Azam et al., 2021; Ali et al., 2021; Azam et al., 2022). Conversely, the consumer confidence index indicates insignificant results which confirming that no impact in PSX.

Conclusion

The empirically tested asset pricing model such as CAPM, Fama and French (1993) three-factor model, Fama and French (2015) five-factor model produced substantially improved findings in emerging as well as developed equity markets around the globe. However, FF5FM is widely tested asset pricing model which improved the R-square and explanatory power of the model. It is therefore, augmented with various risk-factors such as Tobin-q factor by Azam et al. (2022), liquidity and momentum factor by Azam et al.

(2021) which also produced extensively improved estimates. This study used consumer confidence index as additional risk-premium to further investigate whether it contributes in terms of explaining the portfolio returns. The findings reveal that consumer confidence index exhibits statistically insignificant results as coefficients show greater than 0.05 probability values in both cases, as independent variable as well as mediating variables. The study also reveals that FF5FM performs better coefficients results using both SEM and time-series OLS regression techniques in PSX. The investors and portfolio managers should assume these risk-factors before investing in PSX.

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