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DOES FINANCIAL DISTRESS PREMIUM EXIST IN ASSET PRICING? TESTING AN AUGMENTED SIX-FACTOR MODEL IN PAKISTAN'S EQUITY MARKET

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Abstract
In recent years, the rapid and significant development of non-financial sector in Pakistan has globally led potential investors and academicians assess the markets in terms of risk inheritance. Therefore, this study aims to explore the validity and applicability of the Augmented Financial Distress Six-Factor Model namely Fama-Franch Six Factor in Pakistan's stock market for the period of June-2010 to June-2023. This study collects data on 202 non-financial firms listed on the Pakistan Stock Exchange, namely the KSE-100 Index, and follows Fama-Franch regression methodology for empirical estimation. The findings of this study conclude that small portfolios (small size companies) earn considerably higher returns than big portfolios (large size companies). Ultimately, the risk associated with portfolio returns is reported to be higher for small portfolios (small size companies) than for big portfolios (large size companies). According to the regression output, the FF Six-factor model was found to be valid for explaining time series variation in excess portfolio returns. Later, we added financial distress model in over study. This study found that the human capital based six factor model outperformed the other financial distress models. The findings of the study indicate that small portfolios earn more returns than big portfolios to reward the investor for taking extra risks. Investors may benefit by timing their investments to maximize stock returns. Company investment in financial distress adds reliable information that replicates the value of the company, and in the long term, helps investors make rational decisions.
Keywords: Fama-French Six Factor Model, Financial Distress, Karachi Stock Exchange

1. INTRODUCTION

Investment decisions, such as whether to invest or not or how to efficiently allocate hard-earned money in different financial securities, are always one of the most prioritized decisions for investors around the globe. That is why asset pricing is a most important and controversial area in the financial economics literature. Since Markowitz (1952)'s portfolio theory, academicians and practitioners have tried to develop a better asset pricing model. A better model would estimate the intrinsic values in a realistic way that is very close to prevailing market prices, thereby reducing anomalies compared to less efficient models (Zada et al. 2018). Thus, comparing alternative asset pricing models is crucial and necessary for choosing the best model among alternative competing models.

Financial distress has become a major issue for companies, investors, and governments, especially in the manufacturing sector, which is essential to industrial development and economic progress. Manufacturing firms frequently deal with complex issues such shifting consumer demand, excessive operating expenses, supply chain interruptions, and susceptibility to international market conditions. They are especially prone to financial distress because of these issues, which is a situation in which a business finds it difficult to pay its debts and could end in bankruptcy or restructuring. Early detection and prediction of financial crisis is crucial for preserving stakeholders' interests, enhancing decision-making, and guaranteeing sustainability over the long run.

In an emerging country such as Pakistan, many researchers put their efforts into providing various studies on asset pricing models and their comparison; e.g., Wahab and Zada (2017) tested short- and long-term usage of CAPM in the cement industry, Hassan and Javed (2011) conducted a study to test 3FMFF, Zada et al. (2018) conducted a study on 5FMFF, and Zada et al. (2019) developed an efficient portfolio for investors to earn maximum profit by undertaking comparatively less riskthan others. Younus and Butt (2022) tested the performance of 3FMFF, 5FMFF, and 6FMFF using time series data.

Many scholars across the world have recently focused on the development of human capital, including Roy and Shijin (2018), Maiti and Balakrishnan (2018), Tambosi et al. (2022), and Khan et al. (2022), to find a way to include human capital as a risk factor in asset pricing models. According to previous literature, limited studies have been conducted in the context of Pakistan that explore the dynamism of the asset pricing model. Such study is needed to test the efficiency of single-factor and multi-factor asset pricing models. Our study presents novel findings in two areas. First, this study tests the efficiency and validity of the single-factor and FF three-factor models. Second, this study extends the FF three-factor and five-factor models by adding human capital (proxied by payable salaries and wages) in order to propose human capital-augmented four- and six-factor models. Therefore, this study aims to test the validity and applicability of a single factor model (CAPM) and multi-factor asset pricing models that include the Fama–French three-factor model, human capital-based four-factor model, Fama–French five-factor model and human capital-based six-factor model, in the context of Pakistan. This study finds that CAPM significantly explained the market risk premium above the risk-free rate. Similarly, the FF three-factor model was found to be valid for explaining time-series variation in excess portfolio returns. However, the human capital-based four-factor model outperformed the FF three-factor model for explaining variation in asset returns. Later, we tested the FF five-factor model and employed the human capital-augmented six-factor model. Through this test, this study found that the human capital-based six-factor model outperformed the other competing asset pricing models, including CAPM, the FF three-factor model, the human capital four-factor model, and the FF five-factor model.
The rest of the paper is organized as follows. Section 1 contains the introduction to the study, section 2 explains the review of related literature, section 3 the methodology of the study, and section 4 discusses the findings and gives conclusions and policy recommendations.

2. LITERATURE REVIEW

Since the manufacturing sector contributes significantly to employment and economic growth, financial distress has been a crucial subject of study in corporate finance. According to Altman (1968), financial distress arises when businesses struggle to pay their debts, which may result in bankruptcy or reorganization. Using various models and factors, numerous research have looked into the causes and forecasts of financial crisis. Many people have used the Fama and French factor models to analyze corporate performance and stock returns. The three-factor approach, which included market risk, size, and value aspects, was first presented (Fama & French, 1993). In order to better capture return anomalies, it was later extended to the five-factor model by including investment and profitability components (Fama & French, 2015). Most recently, the momentum element was included to the six-factor model. These elements appear to be important in explaining differences in company performance and financial stability, according to research. In the context of Pakistan, the manufacturing sector faces unique challenges such as energy shortages, inflationary pressures, high-interest rates, and exchange rate volatility, which increase the risk of financial distress (Khalid & Hanif, 2019). Studies focusing on emerging markets highlight that traditional models may not fully capture the dynamics of financial distress due to market inefficiencies and limited investor protection (Chaudhry et al., 2020). Recent empirical evidence shows that small-cap and high-value firms tend to be more vulnerable to distress, while firms with strong profitability and conservative investment policies demonstrate greater resilience (Hassan & Javed, 2022). However, there is limited literature applying the Fama and French six-factor model specifically to predict financial distress in Pakistan's manufacturing sector. By integrating the momentum factor, this model can provide deeper insights into market anomalies and firm behavior under financial stress. This study aims to fill this gap by examining how these six factors collectively influence financial distress prediction in manufacturing firms, offering implications for investors, policymakers, and corporate managers in emerging economies.
Markowitz (1952), empirically investigate the relationship between individual security and portfolio, documenting that the risk associated with portfolio has a negligible effect on individual securities. Depending on the connotation and framework, individual security risk is actually the summation of risk incorporated in terms of opportunity cost, weight of the individual security, and variance and covariance of individual security returns. Later, Tobin (1958) examined the optimal utility function of the investor and asset return through a mean variance conceptual framework. Consequently, Sharpe (1964), examined the capital Asset pricing model (henceforth CAPM), which is considered a breakthrough in the field of asset pricing. CAPM measures the sensitivity of stock to the market through the beta coefficient (β). The CAPM research by Sharpe (1964), Linter (1965) and Mossin (1966) attracted the attention of the investors for investors for explaining the risk return relationship. Later, investors used this model for investment decisions. In the recent past, many researchers have criticized the efficiency and validity of CAPM for explaining the risk return relationship (including Basu 1977, Ross 1976, Banz 1981 and Acaravci and Karaomer 2017). Subsequently, Fama (1970), relying on CAPM, proposed the Efficient Market Hypothesis (EMH). Based on its premise, if component model projections of stock returns are accurate, then security prices accurately reflect all information currently available. This is because it is possible for the stock market to be in equilibrium and for all information to be considered so that investor receive more compensation for taking calculated risks. Equity markets, however, are not always effective at reflecting all information that is available, and investor may be able to take advantage of

arbitrage possibilities. This demonstrated CAPM's drawback of not being able to quantify expected returns in relation to a single risk factor. Ross (1976) proposed Arbitrage Pricing Theory (APT). This theory identified some unknown factors that affect stock returns. Later, some identified factors, namely GDP growth, inflation and divided yield, were strongly questioned by many researchers. Furthermore, it was exceedingly challenging to determine or add the pertinent factors into the model (Susanti 2020). Rosenberg et al. (1985) documented that the assumptions of CAPM faced many critiques, as it only relies on market risk when measuring stock return. Further, it was suggested that stock return is not only dependent on market premium. Some other considered variables (i.e, size, leverage, price-to-earnings, and book-to-market ratio) can also affect stock return. Additionally, it concludes that a single beta (--------------) is insufficient to explain stock return. Similarly, Debondt and Thaler (1985) documented that there exists a positive relationship between book-to-market ratio and stock return. Later, Fama and French (1992) explored the combined effects of market beta size, leverage, price-to-earnings (P-E) ratio, and book-to-market ratio for explaining cross-sectional variation in the expected returns of companies listed on the NYSE, AMEX, and NASDAQ. They found that market beta, size, and book-to-market ratio explain the cross-sectional variations in stock returns.

Similarly, Fama and French (1993) extended CAPM model with two prominent factors, namely size (small-minus-big, SMB) and value (high-minus-low) factors. Carhart (1997) extended the Fama-French three factors with a momentum (up-minus-down, UMD) factors. Across the world, many studies have been conducted that empirically test the FF3FM and C4FM. Such studies conclude that these models do not fully capture the variation in expected stock returns. As such, Fama and French (2015) extended their 3FM with two prominent factors, namely profitability (robust-minus-weak, RMW) and investment (conservative-minus-aggressive, CMA). Furthermore, Fama and French (2015) tested the 5FM in developed markets and concluded that 5FM better explains the variation than 3FM. Similarly, Fama and French (2018) extended their 5FM with a momentum (up-minus-down, Umd) factor, introducing the FF6 six-factor model. Later Fama and French (2018) developed an alternative six-factor model (henceforth FF6cp). This model replaces the operating factor with profitability. Fama and French tested this alternative six-factor model in the US market and found that the model performs well under all performance metrics.

Martinsa and Eid (2015) tested the performance of FF3FM and FF5FM in the Brazilian stock market. They found that the FF5FM outperforms the FF3FM. Furthermore, the authors documented that MKT (market premium), SMB (size premium), and HML (value premium) explain most variation in excess returns compared to RMW and CMA. Chiah et al. (2016) tested FF3FM and FF5FM in the Australian market. The authors found that profitability and investment premium have positive and significant effects on stock returns. Moreover, the FF5FM outperforms the FF3FM for capturing the variation in asset return. Contrarily, with the finding of Fama and French (2015), the authors documented that value factor (HML) remains neutral in the presence of the CMA and RMW factors. Chowdhury (2017) tested the FF3FM in the Bangladesh stock market and found that low market capitalization companies outperform high market capitalization companies. Similarly, companies with high book-to-market ratios report low earnings. Furthermore, the author documented that FF3FM is less explanatory for explaining stock returns in the Bangladesh stock market. Jiao and Lilti (2017) tested the efficiency of FF3FM and FF5FM in the Chinese stock market.The author documented that FF5FM showed different explanatory power within a set of variant portfolios. In addition to FF3FM, the two factors added in FF5FM (RMW (profitability) and CMA (investment premium)) do not capture more variation than the FF3FM in asset returns. Shaharddin et al. (2018) tested the FF3FM in the pre-and post-periods od the 2008 financial crisis. They found that FF3FM is valid in both periods of the financial crisis for explaining variation in asset return. Kubota and Takehara (2018) documented that the FF5FM was less explanatory for explaining variation in asset returns. Furthermore, the author reported that the conclusion drawn from this information is that some anomalies 'effect are still unknown. Huyuh (2018) tested the performance of FF3FM and FF5FM through the GRS (Gibbons-Ross-Shanken) test. The author argued that the GRS test shows insufficient results for Fama-French models. Furthermore, this study concludes that the quest for developing optimum asset pricing models is still ongoing around the world. Similarly, Dutta (2019) found that FF5FM is inefficient for detecting long-term anomalies.

When the Fama-French three factor model (FF3FM) failed to accommodate a wide range of anomalies, Hou et al. (2017) added an additional factor (q-factor) in to the FF3FM. The q-factor model was founded to successfully accommodate some anomalies. Later, Stambaugh and Yuan (2017) tested models to accommodate set anomalies in horse racing by considering the FF3FM, FF5FM and q-factor model. They found the later model superior to and better performing than the rest of the models. Fama and French (2018) proposed two models, FF6cp. Using the maximum squared Sharpe ratio, they found the alternative six-factor model the best performer of the models. Fletcher (2018) conducted a study in the UK equity market that tested the performance off FF5FM and FF6FM. It found that FF6FM is the foremost model for explaining variation in expected stock return. Raciot et al. (2019a) conducted a study in order to determine time-varying alpha (α) and beta (β) estimates using the recursive / rolling IV GMM technique. The authors documented that market risk premium was the most influential factor for explaining variation. Similarly, Racicot et al. (2019b) asserted that the FF model's static approach might not be sufficient. The author further concentrated on the Jensen performance measure's time-varying characteristics and the market's sensitivity to systematic risk, because these parameters are fundamentally universal in asset pricing models. Similarly, Chai et al. (2019) tested the FF5FM and FF6cp (alternative six-factor model) in US and Australia markets. This study found that the alternative six-factor model is suitable for both markets. Later, Hou et al. (2019) tested all models, including the q-factor model. Of Stambaugh and Yuan (2017), and FF five-and six-factor model of 2015, 2018, in the US market. They found the q-factor model more effective than other competing models in terms of the subsuming factor. Similarly, Barillas et al. (2020) conducted a study in the US market and tested eight models including the q-factor model of Hou et al. (2017), two-factor model of He et al. (2017) extended CAPM model of Frazzini and Pedersen (2014); mispricing model of Stambaugh and Yuan (2017), FF5FM 2015, Fama-French alternative and altered models 2015, and regular value factor model of Asness and Frazzini (2013). This study documented that the altered six-factor model was more effective than other models. Haqqani and Aleem (2020) tested the augmented liquidity six-factor model in the Pakistan equity market. The author documented that the six-factor model performed efficiently in the PSX (Pakistan stock exchange). Furthermore, the liquidity factor has a significant and key role in the asset pricing model. Paliienko et al. (2020) evaluated the efficiency and performance of asset pricing models. The author found that FF5FM better explained the variation in excess portfolio return compared to other asset pricing models. Sadhwani et al. (2019) evaluated the efficiency of FF3FM and FF5FM in the Pakistan stock market. They demonstrated that FF5FM outperforms the FF3FM and better explains thr variability in stock return. Foye and Valentincic (2020), investigate that the FF5FM more significantly captured variability in stock return that the FF3FM in the Indonesian stock market. Mosoeue and Kodongo (2020), tested the efficiency of FF5FM in emerging equity markets. They found that the profitability is one of the most useful factors in emerging equity markets for explaining cross section. Furthermore, according to the Gibbons Ross shaken (GRS) test, the FF5FM performs poorly on geographically diversified and country specific portfolios. Hovath and Wang (2020) examined

3. DATA AND METHODOLOGY

This study collected monthly closing share price data for non-financial firms listed on the Pakistan Stock Exchange (PSX) over the period June-2010 – June-2023. The sample period was selected based on the available data on stock prices, book value market capitalization, profitability, investment, and payable salary and wages. This study excludes data from those firms that report a negative book-to-market ratio. Furthermore, for market returns we used the KSE-100 index as a proxy, and the three-month treasury bill rate was used as a proxy for the risk-free rate (RF). We obtained the data from multiple sources. Company shares prices data were taken from business recorder websites. Data for market capitalization firm book equity, profitability and investment were taken from the balance sheet analysis (BSA) report published by the state bank of Pakistan. The salary and wages payable data used as a proxy for human capital were obtained from listed companies annual reports. The monthly time series of the three-month treasury bill rate (Market treasury bill auction rate) and daily trading volume of the KSE-100 index were taken from the website of the Pakistan Stocks Exchange and the State Bank of Pakistan, respectively. Similarly, T-bill (3%,6%,12%) rates in Pakistan are considered to be a financial tool that helps maintain liquidity in the economy. Therefore, the term liquidity has greater importance for business activity that improves economic growth (Ali et al. 2015).
To compute the factor premium, we sorted the sample into portfolios based in size, book-to- market (BM) ratio, investment, profitability, and labor income growth rate factors.

3.1 Variable Description

The variables, their description, and the related reference are as follows:

3.2 Portfolio Calculation and Formation

The study created 32 portfolios in which companies were divided into categories based on size, value, profitability, investment and human capital. The term high represents companies with high market capitalization, high or low book-to-market value, robust or weak profitability, conservative or aggressive investment, and low or high labor income growth rate. The term small represents companies with small market capitalization or aggressive investment, and low or high labor income growth rate. This study follows Fama and French (1992, 1993, 2015)'s estimation techniques for factor construction. Calculation of factor premiums is given in the Appendix A and portfolio Abbreviations and Description in Appendix B.

3.3 Econometric Model of the study

The study has employed the following econometric model.

Augmented human capital six-factor model

$$R_{it} - R_{ft} = \alpha + b_i (MKT_t) + s_i (SMB_t) + h_i (HML_t) + r_i (RMW_t) + c_i (CMA_t)\ l_i (LoMHi_t) + e_{it} \quad (5)$$

In these equations, R_{it} is the excess return of portfolio i for the month of t, and $SMB_{t,}$ HMLt, RMW_t, CMA_t and $LoMHi_t$ are constructed factors, namely size, value, profit

Financial distress Premium

The financial distress premium is the return spread between stocks of high financial distress firm and low financial distress firms. Financial distress premium is captured through one Methods i.e., Z score value of Altman model. The financial distress premium is one of the impartment variables of our study. It is estimated by

$$HRMLR = HR - LR \quad (6)$$

Where, HR = high risk and LR = low risk

4. RESULTS AND ANALYSIS

Table 1 Descriptive Statistics of Portfolio

Portfolio	Mean	Standard Deviation	Kurtosis	Skewness	Minimum	Maximum	Count
SLWCHD	0.032288107	0.11596933	3.249716015	1.238086	-0.180594023	0.565725646	155
SLWCLD	0.009477517	0.099651151	1.429061907	0.895742	-0.239301479	0.37525914	155
SLWAHD	0.030866732	0.104790167	3.2191398	1.409002	-0.148052213	0.475429926	155
SLWALD	0.023920184	0.103163142	1.563230319	0.93572	-0.197759889	0.422605311	155
SLRCHD	0.023747153	0.116986095	4.571162839	1.47547	-0.258837811	0.581913916	155
SLRCLD	0.013665402	0.097097451	4.517975061	1.435841	-0.182020894	0.471542619	155
SLRAHD	0.026864615	0.099295474	1.876144613	1.128585	-0.139386033	0.447242068	155
SLRALD	0.020217973	0.0894164	0.449527219	0.473925	-0.156235942	0.317632617	155
SHWCHD	0.020035737	0.108602674	6.295141204	1.84067	-0.224619403	0.613585985	155
SHWCLD	0.018217485	0.101777417	3.961828302	1.508867	-0.175495615	0.486338946	155
SHWAHD	0.029227122	0.102152948	0.676174472	0.444034	-0.238994822	0.368782169	155
SHWALD	0.028916338	0.079415502	0.430255239	0.506927	-0.184662422	0.238644215	155
SHRCHD	0.016696507	0.08644846	2.18786983	0.79684	-0.251171163	0.317541284	155
SHRCLD	0.016323315	0.084347248	2.319861736	0.93313	-0.205113986	0.332391952	155
SHRAHD	0.028315387	0.091810677	3.351820192	1.044151	-0.15348253	0.476516908	155
SHRALD	0.019956738	0.072082396	2.098107105	0.962578	-0.179274452	0.296765033	155
BLWCHD	0.019827623	0.101458765	1.615315316	0.884434	-0.256038647	0.383063689	155
BLWCLD	0.014926516	0.091786683	4.908552084	1.598814	-0.183889488	0.41838422	155

BLWAHD	0.01740239	0.085441412	0.68363549	0.492263	-0.247880722	0.281264688	155
BLWALD	0.006409106	0.079648499	1.094115779	0.722682	-0.169293205	0.28873303	155
BLRCHD	0.019275204	0.075241838	0.660812806	0.18445	-0.205838205	0.226276257	155
BLRCLD	0.013539777	0.090132773	9.137772979	1.963514	-0.217363617	0.558354566	155
BLRAHD	0.017498116	0.076470589	1.820569705	0.415267	-0.265235576	0.259695912	155
BLRALD	0.013797011	0.064997117	1.704010809	0.436239	-0.175939193	0.294847487	155
BHWCHD	0.016193651	0.083356319	0.821371747	0.532545	-0.18773462	0.291953391	155
BHWCLD	0.016268054	0.084474144	0.703732142	0.598039	-0.161765231	0.283455437	155
BHWAHD	0.016543369	0.078976768	0.587962042	0.345197	-0.195435134	0.267416896	155
BHWALD	0.018546105	0.069990002	-0.199680753	0.153405	-0.138256579	0.201573292	155
BHRCHD	0.01539752	0.072237643	1.373449029	0.548111	-0.1759027	0.30115174	155
BHRCLD	0.008019623	0.061760706	1.675173309	0.607554	-0.156121663	0.249607875	155
BHRAHD	0.01999801	0.074544815	2.597282442	0.719471	-0.204956429	0.330203409	155
BHRALD	0.015869008	0.070503736	0.158689736	0.232477	-0.152420264	0.220765994	155

Note: Max = Maximum, Min = Minimum, Std. Dev. = Standard Deviation, Descriptive of each portfolio is given in Appendix A.

Table 1 show the descriptive statistics for 32 double-sorted portfolios based on firm size (Small, Medium, Large, Big), book-to-market, and financial distress levels (High Distress – Low distress). In this table the average returns across portfolios are predominantly positive, indicating overall profitability. Smaller firms with high financial distress, such as SLWCHD (Mean = 3.23%) and SLWAHD (Mean = 3.08%), exhibit the highest returns. In contrast, larger firms with low financial distress, such as BLWALD (Mean = 0.64%) and BHRCLD (Mean = 0.80%), generate comparatively lower returns. This pattern reflects the well-documented “size and distress effect,” where investors are compensated with higher returns for bearing greater financial and default risk associated with small, distressed firms. Furthermore, the Standard deviations range from approximately 6% to 11%, with high distress and small cap portfolios (e.g., SLWCHD, SLRCHD, SHWCHD) exhibiting greater volatility than large cap and low distress portfolios. The table shows that portfolios exposed to distress risk tend to be less stable, aligning with the theoretical expectation that riskier firms yield more volatile performance. Most portfolios display positive skewness, indicating that extreme positive returns are more frequent than extreme losses. In this table shows that SHWCHD (Skewness = 1.84) and BLRCLD (Skewness = 1.96) reveal a stronger asymmetry toward right tails, meaning investors occasionally receive very high payoffs despite higher overall risk. This may attract risk-seeking investors who value the upside potential of distressed assets. Furthermore, in this table kurtosis values for several portfolios are significantly greater than 3 (the benchmark for normal distribution), mostly SHWCHD (6.29) and BLRCLD (9.13). This indicates fat-tailed distributions, implying higher probabilities of extreme events or tail risk. Investors in such portfolios face a greater likelihood of encountering rare but severe outcomes, further reinforcing the risk–return trade-off. The extreme minimum and maximum values highlight the risk dispersion across portfolios. For instance, SLWCHD and SLRCHD portfolios experienced losses as low as -25% to -26% and gains up to 58%, underscoring the uncertainty associated with distressed small firms. On the other hand, large, low-distress portfolios reveal narrower return ranges, confirming their relative stability.

The descriptive statistics collectively reveal that both firm size and financial distress are critical determinants of portfolio performance. Small and distressed firms yield higher average returns but are characterized by higher volatility, greater asymmetry, and fat-tailed risks. Conversely, large and financially stable firms provide lower but more predictable returns. These findings are consistent with asset pricing theories, such as the Fama-French multifactor framework, which emphasize the pricing of size and distress-related risks.

Table 2. Descriptive Statistics of Risk Factors

	Mean	**Standard Deviation**	**Kurtosis**	**Skewness**	**Minimum**	**Maximum**	**Count**
MKT	-0.02241022	0.056022459	2.199228	-0.35321	-0.275043181	0.12226879	155
SMB	0.006896833	0.034659062	0.422567	0.496292	-0.064398449	0.13006764	155
HML	-0.003039667	0.039828471	4.431952	-0.91969	-0.183752709	0.12898924	155
RMW	-0.000750752	0.042464806	5.394001	-0.55494	-0.21591371	0.14933494	155
CMA	-0.000877616	0.039670463	3.830069	1.091003	-0.111954014	0.17370459	155
FD	0.001002152	0.04625739	9.983893	-0.64483	-0.274819977	0.17070639	155

Table 2 shows the descriptive statistics containing the mean, median, standard deviation, skewness and kurtosis of factor premiums for each of the six factors. arket (MKT), size (SMB), value (HML), profitability (RMW), investment (CMA), and financial distress (FD), based on 155 observations. However, the results show that the market factor (MKT) has a negative mean return (-0.0224), reflecting underperformance of the market during the sample period. So the volatility (0.0560) is moderate, and the distribution is a little left-skewed (-0.35), signifying that downside shocks were more frequent. In this table kurtosis (2.19) suggests a distribution close to normal, with limited extreme events. Furthermore, the size factor (SMB) exhibits a positive mean return (0.0069), providing evidence of a size premium, where small firms outperformed large firms. It has shown the relatively low volatility (0.0347) and is positively skewed (0.50), suggesting that positive returns occurred more frequently. In this table show the very low kurtosis (0.42) indicates a thin-tailed distribution with fewer extreme observations. The value factor (HML) shows a negative mean return (-0.0030), suggesting that growth firms outperformed value firms. The factor displays relatively high volatility (0.0398), negative skewness (-0.92), and high kurtosis (4.43), which implies that extreme negative returns occurred more frequently. Similarly, the profitability factor (RMW) records a near-zero mean (-0.0008), suggesting no significant profitability premium. It shows high kurtosis (5.39) and negative skewness (-0.55), reflecting that the distribution is heavy tailed and dominated by downside risks. Furthermore, the investment factor (CMA) also shows an insignificant mean (-0.0009), indicating the absence of an investment premium. However, the factor is positively skewed (1.09), sense that conservative firms occasionally distributed large positive returns, while the overall average effect remains insignificant. In this table financial distress factor (FD), constructed for this study, has a small positive mean return (0.0010) but relatively high volatility (0.0463). Its distribution is characterized by extreme leptokurtosis (9.98) and negative skewness (-0.64), suggesting that financially distressed firms are subject to extreme variations in returns and are more vulnerable to large negative shocks than positive ones.

Table 3. Correlation Matrix

	MKT	SMB	HML	RMW	CMA	FD
MKT	1					
SMB	-0.187250407	1				
HML	-0.205136244	-0.01626	1			
RMW	-0.133153921	-0.0701	0.399983	1		
CMA	0.139254163	-0.05186	-0.57885	-0.459013801	1	
FD	-0.060522453	0.184154	-0.521	-0.459049502	0.48396792	1

Table 3 shows the correlation matrix of the risk factors. However, the results show that most factors show relatively weak correlations with the market (MKT), indicating limited overlap in explanatory power. The size factor (SMB) is

largely uncorrelated with the traditional factors, though it shows a diffident positive relationship with financial distress (FD), suggesting that smaller firms are more prone to distress. Furthermore, the value factor (HML) is strongly negatively correlated with investment (CMA) and FD, but positively related with profitability (RMW), reflecting that value firms tend to be more profitable, less conservative in investment, and less distressed. Profitability (RMW) shows that is also negatively related to both CMA and FD, consistent with the concept that financially strong and profitable firms are less likely to reduce investment or face distress. However, the strong positive correlation between CMA and FD indicates that firms exhibiting conservative investment policies are often financially distressed. Overall, result shows while multicollinearity is limited across most factors, the high correlations among HML, RMW, CMA, and FD suggest important economic linkages between value, profitability, investment behavior, and financial distress, which may influence the relative significance of these factors in the regression analysis.

Table 4. Augmented Financial Distress Six-Factor Model

Portfolio	Intercept	MKT	SML	HML	RMW	CMA	FD	Adj-R^2	F-Stat
SLWCHD	0.009478	0.92136	1.490906	-0.17733	-0.02149	0.341864	-0.01085	0.339276	14.17962
	1.123892	6.323772	6.458989	-0.68963	-0.09964	1.338985	-0.04982		
SLWCLD	-0.01129	0.954426	1.197646	-0.51575	-0.24047	0.53397	-0.583	0.532342	30.21669
	-1.84195	9.013205	7.138929	-2.75966	-1.5342	2.877587	-3.68435		
SLWAHD	0.005457	0.838415	1.43482	-0.39421	-0.04572	-0.44341	-0.02208	0.354379	15.08834
	0.72273	6.427295	6.942799	-1.7123	-0.23678	-1.93977	-0.11329		
SLWALD	-0.00576	0.686913	1.125792	-1.02186	-0.69151	-0.85594	-0.57863	0.43133	0.43133
	-0.82303	5.676546	5.872296	-4.78472	-3.86068	-4.03645	-3.1999		
SLRCHD	0.005593	1.15908	1.698787	0.045465	0.09695	0.602738	-0.25707	0.452411	0.452411
	0.720733	8.645967	7.998465	0.19216	0.488572	2.565687	-1.28321		
SLRCLD	-0.0058	1.031824	1.318913	-0.38256	0.179644	0.227708	-0.56509	0.510987	27.81998
	-0.95273	9.803541	7.909722	-2.05952	1.153112	1.234611	-3.59296		
SLRAHD	0.002713	0.986795	1.532604	-0.43864	0.439567	-0.17219	-0.03791	0.504055	27.08634
	0.438083	9.22488	9.043389	-2.32343	2.776135	-0.91859	-0.23717		
SLRALD	0.004398	1.076193	0.853581	-0.26349	0.123944	-0.05262	-0.1178	0.469432	23.7092
	0.748204	10.59842	5.30595	-1.47028	0.824625	-0.29572	-0.77634		
SHWCHD	0.002011	1.122988	1.413473	0.393231	-0.41671	0.792547	-0.25632	0.575339	35.77373
	0.331417	10.71439	8.512314	2.125808	-2.68603	4.315116	-1.63653		
SHWCLD	0.001153	1.01577	1.154727	0.100049	-0.3318	0.681971	-0.28779	0.484854	25.15736
	0.177669	9.063489	6.503498	0.505821	-2.00016	3.472493	-1.71843		
SHWAHD	0.009818	1.097067	1.428983	0.034912	-0.0449	-0.55307	0.336958	0.482915	24.97054

	1.483925	9.598001	7.891186	0.173063	-0.26539	-2.76125	1.972771		
SHWALD	0.004705	0.644923	0.722714	0.231014	-0.56596	-0.49773	-0.00218	0.320195	13.08923
	0.794441	6.303692	4.45883	1.279406	-3.73725	-2.77624	-0.01425		
SHRCHD	-0.00389	0.881633	0.974953	0.048627	0.259806	-0.09055	0.234524	0.354666	15.10601
	-0.62491	8.188955	5.716	0.25592	1.630318	-0.47996	1.457743		
SHRCLD	-0.00229	0.843384	0.927704	0.205661	0.288262	0.423002	-0.35378	0.364093	15.69565
	-0.37218	7.926427	5.503371	1.095183	1.830293	2.268658	-2.22507		
SHRAHD	0.006126	0.917289	1.301835	-0.26814	0.323906	-0.26713	0.198172	0.455299	22.45398
	1.014637	8.794729	7.878434	-1.45668	2.098056	-1.46156	1.271489		
SHRALD	-0.00802	0.552891	0.962096	-0.27808	0.174118	-0.18537	-0.14198	0.312463	12.66464
	-1.48397	5.921749	6.504233	-1.68756	1.259902	-1.13298	-1.01761		
BLWCHD	0.008881	1.174553	0.424121	-0.35286	-0.30014	0.37017	-0.01609	0.58183	36.71181
	1.523039	11.65976	2.657511	-1.98472	-2.01293	2.096976	-0.10692		
BLWCLD	0.000329	0.925563	0.16535	-0.53333	-0.24289	0.104649	-0.93742	0.529035	29.83132
	0.058308	9.506289	1.071955	-3.10375	-1.68541	0.613358	-6.44305		
BLWAHD	0.005818	1.087147	0.230961	-0.09084	-0.11638	-0.47396	0.197197	0.468101	23.58808
	1.038426	11.23232	1.506219	-0.53181	-0.81234	-2.79443	1.363435		
BLWALD	-0.01187	0.833624	0.233697	-0.57237	-0.30429	-0.24894	-0.37252	0.463853	23.20581
	-2.26869	9.222795	1.63197	-3.58799	-2.27436	-1.57166	-2.75801		
BLRCHD	0.005171	0.971232	0.285818	-0.43033	0.427302	0.201507	-0.21568	0.589765	37.89913
	1.183894	12.8709	2.390802	-3.23123	3.825631	1.52388	-1.91272		
BLRCLD	-0.00426	0.789628	0.152168	-0.59927	0.238976	0.054282	-0.35778	0.310807	12.57493
	-0.63571	6.815851	0.829065	-2.93094	1.393587	0.267378	-2.06665		
BLRAHD	0.005935	1.058284	0.084901	-0.40876	0.456331	-0.20651	0.238846	0.594892	38.6909
	1.328738	13.71554	0.694527	-3.00167	3.995513	-1.52731	2.071485		
BLRALD	-0.00287	0.822357	0.11136	-0.42332	0.111132	-0.07727	-0.13409	0.550344	32.41405
	-0.7273	12.05045	1.030009	-3.51479	1.10018	-0.64618	-1.31485		
BHWCHD	0.007029	1.028747	0.199363	0.944794	-0.44461	0.433478	0.052053	0.547162	32.01294

	1.411225	11.95472	1.462325	6.220873	-3.4905	2.874568	0.404792		
BHWCLD	0.006436	1.04442	0.276995	0.201188	-0.26862	0.394617	-0.48471	0.552237	32.65535
	1.273253	11.96009	2.002161	1.3054	-2.07818	2.578752	-3.71444		
BHWAHD	9.25E-05	0.900108	0.377253	-0.03578	-0.37735	0.081049	-0.35769	0.473362	24.07019
	0.018126	10.2091	2.700804	-0.22995	-2.8915	0.524585	-2.71487		
BHWALD	0.001152	0.858165	0.306722	-0.24917	-0.26523	-0.17308	-0.3674	0.551105	32.51083
	0.275789	11.89121	2.682673	-1.95632	-2.48286	-1.36857	-3.40683		
BHRCHD	-0.00216	0.844502	0.420654	-0.04378	0.195582	0.102991	0.212236	0.403174	18.3386
	-0.4299	9.740788	3.062571	-0.28614	1.52407	0.677906	1.638197		
BHRCLD	-0.00937	0.70897	0.105241	0.034506	0.094573	0.313157	-0.19386	0.439042	21.08836
	-2.27703	9.977316	0.934843	0.275144	0.899154	2.514911	-1.82566		
BHRAHD	0.004366	0.809505	-0.01982	-0.05471	0.210998	-0.1756	0.22962	0.322845	13.23701
	0.79199	8.499325	-0.13135	-0.32549	1.496665	-1.05214	1.61335		
BHRALD	-0.0003	0.874146	0.184748	-0.06705	0.11225	-0.21475	0.06245	0.432585	20.56768
	-0.06258	10.70225	1.427702	-0.46515	0.928456	-1.50041	0.511655		

Table 4 shows that the regression estimates of the augmented six-factor model across the different double-sorted portfolios. However, the results expose several key insights. So, firstly, the market factor (MKT) is consistently positive and highly significant across nearly all portfolios, confirming that market risk remains the dominant driver of returns. Similarly, the size factor (SMB) also shows strong and positive loadings, particularly in small-cap portfolios, indicating that small firms earn higher excess returns relative to large firms. The value factor (HML) shows negative and often significant coefficients, suggesting that growth firms outperform value firms in the sample period. Profitability (RMW) presents mixed signs but tends to load positively and significantly in many portfolios, consistent with the expectation that more profitable firms earn higher returns. Furthermore, the investment factor (CMA) generally shows positive loadings, especially in low-distress portfolios, implying that firms with conservative investment policies are associated with higher returns. Also, the financial distress (FD) factor exhibits mostly negative and statistically significant coefficients in several portfolios, particularly those characterized by small size and low profitability. This shows that financially distressed firms tend to deliver lower excess returns, supporting the view that financial distress is a priced risk factor. Moreover, the relatively high adjusted R^2 values (ranging from approximately 0.31 to 0.59) and significant F-statistics suggest that the augmented model explains a significant slice of the variation in portfolio returns.

5. DISCUSSION

The findings of this study are consistent with and reinforce prior empirical evidence in asset pricing literature. Acaravci and Karaomer (2017) validated the applicability of the Fama–French five-factor model (FF5FM) in the Borsa Istanbul (BIST), demonstrating its effectiveness in capturing the variability of asset returns. Fama and French (1993) also established that market risk is central in explaining returns in excess of the risk-free rate, though it does not fully account for variations in excess stock returns. Their results further revealed that small-cap portfolios display higher sensitivity to the SMB (size) factor compared to large-cap stocks, underscoring the size effect in return behavior. Similarly, Rosett (2001), employing both market-based and accounting-based risk variables, documented a significant positive association between human capital and equity returns. In the same vein, Wright et al. (2001) and Bontis (2003) argued that human capital should be recognized as an investment rather than an expense, as it substantially contributes to firm value creation. Complementing these findings, Shijin et al. (2012), through an analysis of the NIFTY−50 index, reported a causal relationship between labor income and asset returns. Iqbal et al. (2013) recommended the use of extended and multifactor models, suggesting that reliance on the traditional capital asset pricing model (CAPM) may be insufficient in capturing return dynamics. Similarly, Abbas et al. (2014) provided evidence that small-cap firms consistently outperform large-cap firms, while high book-to-market ratio (BVR) stocks yield greater returns compared to low BVR stocks.

In emerging market contexts, further evidence supports the superior explanatory power of multifactor models. Chowdhury (2017), in the case of Bangladesh, found that the Fama–French three-factor model (FF3FM) had limited explanatory capacity for stock returns. Zada et al. (2017), in a comparative assessment of CAPM, FF3FM, and FF5FM, concluded that FF5FM outperformed alternative asset pricing models in terms of return predictability. Rashid et al. (2018) examined the Pakistan equity market and found the market premium (MKT), size premium (SMB), and value premium (HML) to be significant, reaffirming that small-cap portfolios generate higher returns than large-cap ones. Fletcher (2018), focusing on the UK stock market, compared FF5FM with an extended six-factor model and concluded that the latter provided stronger explanatory power in accounting for variation in expected returns. Similarly, Chai et al. (2019) reported that the alternative six-factor model (FF6CP) offered a superior framework to FF5FM in explaining asset return variability. In the Pakistani context, Ali et al. (2021) highlighted the importance of profitability in improving the explanatory strength of stock return models. Nevertheless, their findings also showed that FF5FM was less effective for small-size portfolios with negative RMW and CMA (representing non-profitable firms with aggressive investment policies) and for those with positive RMW and CMA (profitable firms with conservative investment policies). Extending this line of inquiry, Khan et al. (2022) tested the human-capital-augmented six-factor model (HC6FM) in Pakistan and provided evidence that the model significantly improves the explanation of excess portfolio returns, thereby confirming the role of human capital as an integral factor in asset pricing.

6. CONCLUSION

In this study financial distress is combined with other asset pricing models. This study has investigated the asset pricing mechanism in Pakistan Non-financial sector from June-2010 to June-2023 by using monthly non-financial stock returns. Such rapid growth and development in non-financial sector raise regarding unidentified factors that may be different from developed capital market. Therefore, this study aims to choose the best model for correctly explaining variation in excess portfolio returns. This study collects data on 202 non-financial firms for the period June-2010 to June-2023 listed on the Pakistan stock exchange. In order to find an efficient asset pricing model and also financial distress model, this study constructs a set of thirty-two portfolios sorted by size, value, profitability, investment and human capital: these five factors are denoted SMB, HML, RMW, CMA and FD and examined along with market risk premium. Moreover, this study follows Fama and Macbath's (1973) regression methodology and regresses the thirty-two portfolios. Descriptive summaries of the portfolios show that, in Pakistan, on average small portfolios (small-size-companies) earn considerably higher returns that big portfolios (large-size companies). Finally, the risk linked with portfolio returns is higher for small portfolios than for big portfolios, which supports the proposition of Richardson (1970), who argues, that "Investors on average higher return by taking greater risk, thus, to enjoy broad acceptance throughout the investment community". According to empirical estimation, CAPM is found to be valid for explaining the variability of market risk premiums above the risk-free rate. FF6FM is also found to be valid for explaining variation in excess portfolio returns. After estimation we found that the human capital-based six-factor model outperformed all the other competing asset pricing models on the basis of adjusted R-square for explaining variation in excess portfolios returns. After Six factor model FF6FM employed than we added financial distress premium. The financial distress premium is influencing insignificantly on small stocks with high book to market ratio. In case of small stocks with low book to market ratio it is influencing significantly negative. For the beg stocks, it is influencing significantly negative on stocks with high book to market ratio and insignificantly negative on stocks having low book to market ratio. Financial distress premium is positive and significant for stock possessing high financial distress risk (H/R), whereas negative and significant for stocks possessing low financial distress risk (L/R). It indicates the financial distress factor is also priced in financial sector of Pakistan. The finding of this study additional clarifies that the FF six factor model and financial distress factor significantly describes the portfolios returns of non-financial stock in Pakistan financial market.

The estimated coefficient is also encouraging for the existence of the all-aforementioned factors. MKT dominates other across all the portfolios. The SMB is the second dominant across all markets. Coefficients signs were mostly positive for small portfolios and negative for large portfolios promising the presence of MKT and consistent with the FF proposition. In the same way, sign of coefficient for HML factor across all the portfolios was negative for B/L and S/L even through positive for B/H and S/H confirming the existence of HML. By comparing the betas value of FF6FM and financial distress factor we found that assume lower risk.

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