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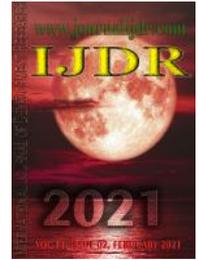
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RESEARCH ARTICLE

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MEASUREMENT OF FINANCIAL STABILITY RISK AND ITS IMPACT ON RETURN OF ASSETS – A CASE STUDY OF PAKISTAN STOCK EXCHANGE

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ABSTRACT

A successful investment environment normally has positive earnings trend that ultimately beneficial for the stakeholders. In efficient market environment better earnings encourages healthy investment. However, in Pakistan enough attention has not yet been paid to this area which resulted in unsatisfactory growth of investment. Pakistan is now emerging as one of the efficient and potential market for investors; therefore, identification of investment sectors which generate healthy returns is inevitable. For the purpose it is essential to examine the relationship of risk and return in the financial market of Pakistan. The aim of research was to examine the relationship among these variables by using F-Score sorted portfolio method and to check its viability in the context of Pakistan Stock Exchange (PSX). The objective could be obtained by analyzing the relationship of risk and return by using Piotroski's (2000) F-Score sorted portfolio method based on historical financial information. For this purpose, various Commonly Assets Pricing Models i.e CAPM, Fama French three factor model and Fama French five factor model were used to test collected data statistically for abnormal returns. The data was collected from various sources particularly from Thomson Reuters Data Stream for accounting data, Pakistan Stock Exchange and State bank of Pakistan website for daily share prices and Treasury bill rates. It was concluded that F-Score sorted portfolio of high ranked companies has high risky impact over returns whereas low F-Score companies return was less. The research study also revealed that the abnormal return could not be generated in PSX, based on financial statement information (F-Score).

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INTRODUCTION

The standard portfolio theory was introduced by Markowitz (1952) which become the root cause for emerging the variety of the asset theories. The most familiar is CAPM introduced by Treynor (1961) Sharpe (1964), Lintner (1965) and Mossin (1966). The model was reliable due to its distinctive features of covering two types of risks as far as individual investment is concerned.

- Systematic Risk which covers market risk and captured from market
- Unsystematic Risk which is specific and non-market risk. It is company specific risk, such as leverage risk, cash flow risk and company risk.

According to Jensen and Scholes (1972), CAPM is therefore truly defines as "any difference in the returns of investment is only because of its systematic risk", the statement is further supported by Fama and Macbeth (1973). But at the same time according to EMH (Efficient Market Hypothesis) this model works appropriate if the market is efficient, (Kendall 1953) "The Analysis of Economic Time Series",

the EMH encouraging free floating of stock prices by taking into consideration all the information available in the market. Consequently, Fama and French (2008) claimed that stock prices are impartial and unpredictable. However, in the late 20th century many empirical tests were found by the Researchers predictable, hence the model loses its popularity. The abnormal rate of return is caused in cross sectional and time series stock returns usually considered as market anomaly which contradicts financial market theories (Bodie, Kane and Marcus; 2009), therefore there are certain financial anomalies which caused abnormal returns. Anomalies are trading opportunities that arise from strategies by which stock trading trend result in abnormal return, (Hubbend; 2008). The present study emphasizes on fundamental types of anomalies as it deals with financial data, analyses of stock and all those factors which influence or may influence the value of the company's asset growth. The study will examine the relationship between risk and return and will also help in understanding the importance of risk in developing economies like Pakistan. Due to the fact that Pakistan is a developing country and trying to emerge as a growing economy, the stock return with risk free criteria is a fairly new topic. The study will provide a systematic method and application which can be helpful for firms and investors

to manage their risk. The results of the research will encourage investors to take advantage from certain strategies which may help them to take advantage from the financial information of the firms.

The objectives of the study was to analyze the relationship of risk and stock returns by means of Piotroski's F-Score calculations and nine signals of historical accounting data within the context of PSX. Beside that the objective was also to find whether F-Score sorted portfolio abnormal return exist in Pakistan Stock Exchange. Further to check impact of various asset pricing models i.e. CAPM, FF₃ and FF₅ on the profitability of these F-Score sorted portfolios on PSX.

The research study was conducted to find out the answers of the following questions:

- 1- Is F-Score significant in investment decisions.
- 2- Are F-Score sorted portfolio abnormal return exists in Pakistan Stock Exchange (PSX)
- 3- Do the commonly used risk factors explain the profitability of these portfolios.
- 4- Do the CAPM, FF₃ and FF₅ models explain the profitability of these portfolios in PSX.

In financial markets like Pakistan which is very volatile and experienced several ups and downs over the years, the collection of data cannot be considered as very accurate. The actual behavior of the financial market cannot be determined without thorough study and inns and out of the market behavior over the time. The problem of missing values was also considered as a hurdle. Moreover, in Pakistan, the trend of conducting research on stock variables and obtaining their subsequent results were very discouraging. Resultantly very limited literature was available to support the study.

LITERATURE REVIEW

Risk Measurement: Agarwal and Taffler (2008) in their study have pinpointed the anomalies related to asset cost of the returns and mispricing of distress companies. The sample was taken from London Stock Exchange (LSE) which was comprised of non-financial firms from the year (1979-2002). They analyzed the data by using regression model and tried to find link among the factors like momentum, book to market ratio and bankruptcy risk. A criteria was fixed to separate firms which face low failure risk as compare to the firms face greater risk. They used profit before tax, current ratio and current liabilities and non-credit interest as independent variables. They concluded that in United Kingdom the firms with financial distress earned low profit as compare to non-distress firms however certain effect like size and book to market ratio were not linked with the distress firms risk. The incapability of market to cohere bad news cause the underperformance of financially distressed firms and encourage the continuation of stock returns pertains to medium term. A study was conducted by Lee and Yeh (2009), they studied the relation of appropriate behavior with financial risk. The data relating to three variables was obtained from the stock exchange of Taiwan. The companies were listed during the period of financial distress/low profit for the period from 1996 to 1999 were selected. The three variables which were selected for empirical test were percentage of adjusting holding of shareholders on the occasion of bank loans initiation, cash movement right hold away and controlling distress percentage. Binary logistic regression was used to obtain the results, positive relationship among three variables to the risk of financial distress was found. It was also observed that weak corporate governance was another cause of possible financial distress and economy recession. The regression results showed that already financially weak firms have chances of facing financial distress as compare to the firms which were financially strong. In 2012, Farooq and Nazir measured the cost of financial distress by taking data from Karachi stock Exchange (KSE). They selected listed manufacturing concerns of KSE. The methodology was based on independent T-Test and differential of mean. They concluded that firm have to suffer opportunity loss where they initially enter and finally leave the financial distress.

Asset Return: A study was conducted by Duran et al (2014) has showed that Piotroski's F-Score is statistically significant results in the level of various variables. The results further indicated that Piotroski's F-Score was significant under econometric terms for the Mexican data and contributes to Ohlson model in a positive way. A study was conducted by Tripathy and Pani in 2016. Panel data was used to observe the effect of F-Score on stock returns. Stock performance was checked by the variables i.e. Returns on market and book to market value. The objective of the study was to check that an investment strategy if based on Piotroski's (F-Score) was applied to portfolio of companies having high B/M ratio can affect positively in favour of investor in the Indian market. The empirical results showed that high B/M companies having high F-Score has the ability to affect the future stock performance in favour of investors in the Indian market. The results were helpful for the individual investors, fund managers and investment strategies in Indian market. Effectiveness of Piotroski's F-Score for Finnish stocks was another study conducted by Kansanen 2016. F-Score based portfolios were constructed and Sample of 112 listed companies in Finnish stock were taken for 12 years effecting from 2004 to 2015. The Capital asset Pricing Model (CAPM) was used for empirical measurement of the significance of the returns. The result showed that those portfolios which have high ranked F-Score companies showed higher risk adjusted returns whereas low ranked F-Score companies showed comparatively low risk adjusted returns. The results were however not statistically significant. The Researcher concluded that if small size companies were taken to analyze risk and returns relationship, F-Score based portfolios approach was even ideal and best approach.

Bulow (2017) inducted a study on effectiveness of fundamental analysis on value stock based on Piotroski F-Score. He tried to investigate that when fundamental investing strategy applied to value stock which is based on Piotroski F-Score is useful in differentiating loser stock from winner stock. He selected US Stock Market because of the reason that US Market condition for the investors was suddenly changed in US after the introduction of Piotroski investment strategy. He showed that an investment strategy that buys high F-Score (7-9) can earn more return as compared to low F-Score (0-2). It was also concluded that basic and essential analysis can be used to distinct winner stock from the loser stock and high book to market stock can generate abnormal return and was a compensation for financial distress. Yasar (2018) conducted a study to compare CAPM, FF₃ and FF₅ models for the Turkish Stock Exchange. Independent Variables taken for the study were book equity, book to market ratio, market capitalization and operating profitability whereas stock return was taken as dependent variable. Empirical tests were conducted on CAPM, FF₃ and FF₅ models. It was concluded that CAPM has not capacity to explain monthly actual returns of sorted portfolios. It was observed that despite having significant co-efficient, intercept and T-values, the FF₃ have problems in explaining the monthly portfolio returns. The equally weighted sorted portfolios was used for all models so that cross sectional variations of stock return can be checked. It was further concluded that FF₅ can explain the portfolio returns variations properly though not 100% perfect, however, strongest among three as far as performance was concerned.

Relationship between Measured Risk and Asset Return: A Research was conducted by Malik et al (2013), the purpose of research was to measure the relationship between the stock risk and market performance with the help of "Z" score model. The data was extracted from PSX and it was concluded that those firms which were unable to have positive return cannot perform positively where as strong firms have the capability to remain stable with increasing return. Researcher described the distress risk as a systematic risk as far as Pakistan Stock Exchange was concerned. In 2016, Karki studied the cross sectional portfolios in order to analyze their return. The CAMP and FF₃ models were used to explain the relevancy of cross sectional portfolios return. For this purpose, the research data was collected from the Nepalese Stock Exchange (NPE) for the period from 2007 to 2013 ((7 years). He applied both models and concluded that FF₃ model has the characteristics to better explain the relevancy of variables as compared to CAPM. It was observed that

FF₃ model showed more clearly the significance of market access return and value factor as compare to size factors of firms. The researcher used dummy variable to test the seasonal effect. It was concluded that except in the period of festivals the seasonal effect was significant especially at the end of fiscal year. This could be the cause of tax loss in the stock market. According to Mwaurah (2017) research study which was conducted at the Kenyan Stock Exchange (KSE) from 2006-2015 on listed banking companies. The variables selected for the purpose was stock return (dependent variable) and credit risk, market risk, capital risk and liquidity risk (independent variables). Another variable namely Bank size was taken as a moderator variable. Multivariate Generalized Regression model was used to analyze the result. The researcher checked both the financial risk of individual firm impact on stock returns and combine affairs of financial risk on stock return. The result have a positive significant impact on independent variable as far as financial risk was concerned. On the other hand, dependent variable i.e. financial risk had significant but negative impact on the stock return.

The investment technique of Piotroski (2000): The idea generated by Piotroski is based on F-Score calculation which was used for determining the financial health of a firm. Usually F-score strategy is helpful in differentiating weak firms from strong firms. Piotroski (2000) was of the view that the average returns of a high BM investment portfolio usually perform well in the market. The BM ratio is a financial ratio helpful in determining a stock overvalued or under value position. If a market value of a company is trading higher than its book value per share will be considered to be overvalued and if book value is higher than the marketing value than it will be considered as undervalued. According to Piotroski this investment strategy can increase the return of a portfolio with high investment if only strong firms in the sample of high BM firm will be selected.

Risk and Expected Return Evaluation Models: The most widely used models for estimation of risk and expected return on investment are Capital Asset Pricing Model (CAPM), Fama French Three Factor Model (FF₃ Factor), Fama French Five Factor Model (FF₅ Factor).

Capital Asset Pricing Model (CAPM): It has been a problem to determine asset return in various economies. The CAPM is a traditional assets pricing model using only one variable to describe the return of a portfolio. It is used to estimate the risk and expected return on an investment. The model is defined by using the following formula;

$$R_{i,t} - R_{ft} = (Jensen) + MKT(R_{m,t} - R_{ft}) + \epsilon_{i,t}$$

The Fama French Three Factor Model: Various attempts were made by researchers like Merton (1973) and Ross (1976) to improve the model by including multiphase characteristics of financial market. But FF₃ factors replaced the CAPM to overcome the flaws encountered by the researchers for accurate estimation. The FF₃ factor model was introduced by Fama and French (1992). It comprises of two additional factors over CAPM. The resultant model is:

$$R_{i,t} - R_{ft} = (3-factor) + MKT(R_{m,t} - R_{ft}) + \epsilon_{i,t} + \beta_{SMB} SMB + \beta_{HML} HML + \epsilon_{i,t}$$

The Fama French Five Factor Model: In 2015 Fama and French further improved the FF₃ model by adding two additional features i.e. profitability factor and investment factor. Fama and French decided to introduce a 5 factor model to analyze the explanatory power of variables. The variable of profitability is denoted in the model as RMW (Robust minus Weak) and the variable of profit was denoted as CMA (Conservative Minus Aggressive). The model is as under

$$R_{i,t} - R_{ft} = (5-factor) + \beta_{MKT} MKT(R_{m,t} - R_{ft}) + \beta_{SMB} SMB + \beta_{HML} HML + \beta_{RMW} RMW + \beta_{CMA} CMA + \epsilon_{i,t}$$

Research Hypothesis

From the reviewed literature following hypothesis have been developed;

- 1- H_{10} = F-Score sorted portfolio abnormal return exists in Pakistan Stock Exchange
 H_1 = F-Score sorted portfolio abnormal return does not exist in Pakistan Stock Exchange
- 2- H_{20} = Jensen Alpha of portfolio is equal to zero
 H_2 = At least one of the Jensen Alpha of the portfolio is not equal to zero
- 3- H_{30} = Alpha of Fama French three factor model of the portfolio is equal to zero
 H_3 = At least one of the Fama French three factor model Alpha of the portfolio is not equal to zero.
- 4- H_{40} = Alpha of Fama French five factor model of the portfolio is equal to zero
 H_4 = At least one of the Fama French five factor model Alpha of the portfolio is not equal to zero.
- 5- Wald Test (Joint hypothesis)
 H_{50} = All the intercepts of the portfolios are jointly equal to zero
 H_5 = At least one of the alpha of the portfolios is not equal to zero

RESEARCH METHODOLOGY

Research Design: The research data was mainly extracted from secondary sources and the method of data analysis was comprised of quantitative techniques. The monthly returns on stock and other data was collected i.e. annual accounting data from Thomson Reuters Data Stream. The data was comprised of the companies listed and delisted on PSX. The delisted companies were taken in order to justify survivorship bias (Kostakis et al 2011). Data of only non-financial companies were taken as the financial companies i.e. Banks, Development Financial Institutions, Insurance Companies, Mutual Funds, leasing etc were different when we deal with computation of assets and liabilities of these companies. The treatment in accounting was different of both sectors i.e. financial and non-financial. The method which was used for this purpose is Piotroski's F-Score method.

Calculation of F-Score: The Piotroski's F-Score is actually named after Prof. J.D. Piotroski (USA), according to his conclusions certain ratios derived from financial statement of firms to determine their financial health, whereas financial strength of the company was tested by using Piotroski (2000) 'F-Score Method'. The scores were usually from 0 to 9. As each number shows the financial strength of the firm, the greater the score, greater will be the strength of the firm. The formula normally used to determine F-Score is as under.

$$F = F_{ROA} + F_{CFO} + F_{ROA} + F_{ACC} + F_{LEV} + F_{LIQ} + F_{NOS} + F_{GPM} + F_{TAT}$$

Where:

1. F_{ROA} = Positive return on assets (ROA great than 0). ROA = Net Income / Total assets.
2. F_{CFO} = Cash flow approach is better way to measure earnings.
3. F_{ROA} = Positive change in return in assets.
4. F_{ACC} = Healthy operating cash flow:
5. F_{LEV} = Decrease in long term debt as compared to preceding year.
6. F_{LIQ} = Healthy current ratio as compared to the preceding year.
Current Ratio = Current Assets / Current Liabilities
7. F_{NOS} = Decline in a stock dilution as compared to preceding year
8. F_{GPM} = Health gross profit as compared to preceding year.
9. F_{TAT} = Increasing trend of sales and assets turn over as compared to preceding year.

The above 9 factors were calculated by the data of the companies collected from the Thompson & Reuters data stream and a cumulative F-Score of every firm for each financial year (t-1) was obtained.

Calculation of Equally weighted and Value Weighted Returns: The next step was the calculation of value weighted and equally weighted returns of every single portfolio for each financial year i.e.

(t+1) on monthly basis for 17 years (2000-2017). Time series returns of portfolios were obtained by taking values of both returns.

Construction of Portfolios: All the companies were kept in ascending order (Low to high F-Score) by sorting. The corresponding equally weighted and value weighted returns moved with each company to their new position. Ten portfolios of ten percent of total companies were constructed. Out of ten portfolios firms of low F-Score were separated from the firms of high F-Score portfolios in order to merge extreme low and extreme high score portfolios.

Three Steps Empirical Tests for checking the Risk Adjusted Performance: Then the values were tested on following assets pricing models to see the risk adjusted performance.

Jensen Alpha from CAMP was estimated

$$R_{i,t} - R_{ft} = (Jensen) + MKT(R_{m,t} - R_{ft}) + \epsilon_{i,t}$$

Where:

$R_{i,t}$ is the return of portfolio 'i' in month t,

R_{ft} is the risk-free rate of month 't' captured by 6 monthly T-bill rate,

$(Jensen)$ is the intercept of the Capital Asset Pricing Model

$R_{m,t}$ is the return of market portfolio, captured by Karachi Stock Exchange all index,

$R_{m,t} - R_{ft}$ is surplus market portfolio return in month 't',

MKT is the exposure of portfolio 'I' to the (market return).

$\epsilon_{i,t}$ It is the error term of Capital Asset Pricing Model

Then the 3-factor alpha the intercept of the Three-factor Fama and French (1996) model was computed as under;

$$R_{i,t} - R_{ft} = (3-factor) + MKT(R_{m,t} - R_{ft}) + \epsilon_{i,SMB} SMB + \epsilon_{i,HML} HML + \epsilon_{i,t}$$

Where $(3-factor)$ = Fama-French 3-factor alpha,

SMB is a size factor,

HML is value risk factor,

$\epsilon_{i,SMB}$ and $\epsilon_{i,HML}$ were their respective coefficients, which captures the risk sensitivity of size and value factors.

$\epsilon_{i,t}$ was the error term of Fama-French 3-factor model

Finally, the 5- factor alpha was estimated

$$R_{i,t} - R_{ft} = (5-factor) + \epsilon_{i,MKT} (R_{m,t} - R_{ft}) + \epsilon_{i,SMB} SMB + \epsilon_{i,HML} HML + \epsilon_{i,RMW} RMW + \epsilon_{i,CMA} CMA + \epsilon_{i,t}$$

Where $(5-factor)$ is equal to Fama-French 5-factor alpha,

SMB was a size factor,

HML was value risk factor,

RMW = investment factor,

CMA = Profitability risk factor,

$\epsilon_{i,RMW}$ and $\epsilon_{i,CMA}$ = Coefficient which captures the risk sensitivity of investment.

$\epsilon_{i,t}$ was the error term of Fama-French 5-factor model

Generalized Method of Moments (GMM): GMM was developed by Hansen 1982 but first introduced by Pearson in 1984. It was a generic method for estimating parameters in statistical models. Generally, it was used in a model where data is non normally distributed. It was applied for the estimation of semi parametric model due to the finite dimensional parameter. GMM estimators were constant, normal and efficient in the class of all estimators and do not require any extra information other than that contained in the moment condition. Here it was also used for estimation of equation based on Newey and West (1987).

Wald Test: The Wald-Test has been used to determine that how the parameter which have been estimated were different from zero under null hypothesis. The test shows joint significance which was necessary to analyze the overall fitness of model.

RESEARCH FINDING

Decile portfolios features based on F-Score calculations: The empirical results were explained by presenting the specific characteristics of decile F-Score based portfolios. Table 1 comprises of different descriptive statistics for each F-Score based portfolio extracted from the whole sample for a period i.e January 2000 to December 2017. All stock listed in Pakistan Stock Exchange were sorted in ascending order at month (t) as given in the values of financial statement information and subsequently assigned to ten different portfolios (P_1 to P_{10}). The decile portfolios (P) represent the portfolios constructed by calculating F-Score. Portfolio (P_1) comprised of extreme low F-Score companies and (P_{10}) was comprised of the companies with extreme high F-Score. The column before T-Test represents the difference of P_{10} and P_1 which was actually the spread between portfolio 10 and portfolio 1. The table further shows the calculation of equally weighted returns, value weighted returns, market value and CAPM beta which was a full sample beta. The equally weighted returns show the excess returns percentage per annum whereas value weighted excess returns percentage per annum represent annualized average monthly return of value weighted portfolios. MV shows the average market value of stock returns of each portfolio whereas CAPM beta represents full sample beta estimates of the Value weighted portfolio returns. The analysis show that portfolio P_1 which have low F-Score firms has low value of beta i.e 0.93. It reveals that they were less risky but on the other side equally weighted and value weighted returns show that the firms were producing lower profits i.e 0.24% and 0.19% P.A whereas P_{10} which has high score firms have high beta of 1.08 value which points towards high risky companies and they are getting high returns of equally weighted 0.41 and value weighted 0.27% P.A. The partial difference between P_1 and P_{10} in respect of equally weighted and value weighted returns has been estimated as 0.17(0.25) and 0.08(-0.86). Both were statistically insignificant as far as decile portfolios were concerned and the difference in means between the values of P_1 and P_{10} does not exist as well. Therefore, our results were contrary to the theory what we have discussed in the reviewed literature. Keeping in view our findings we can conclude that F-Score calculation anomaly does not exist in PSX during the period of study.

Risk Adjusted Performance: The results shows the risk adjusted performance of the decile portfolios which has already been constructed by keeping in view F-Score values. It was checked that whether the F-Score based strategy for investment was feasible and beneficial for all three models i.e CAPM, Fama-French three factor and Fama-French five factor. The calculations were based on three models i.e Capital Asset Pricing Model (CAPM), Fama French three factor model (FF_3) and Fama French five factor model (FF_5). The monthly and annual figures of stock returns were the basis of calculations of F-Score. The above table reflects the equally weighted risk adjusted performance of financial statement analysis and risk based investment strategies. The asset pricing models used for the estimation were CAPM, FF_3 and FF_5 . The difference between P_1 and P_{10} reveals the spread between two most extreme decile portfolios. The alpha however indicates the risk adjusted performance of F-Score based investment strategies. The F-Score based analysis were reported using equally weighted portfolios. The T-Statistics indicating the statistical significance of corresponding co-efficient at different levels of significance. These values have been shown in parenthesis. The table clearly indicates that CAPM alpha values of P_1 which contains low F-Score based firms has a value of 0.004 and P_{10} which has high F-Score based firms has a value with negative sign i.e. -0.005. Further the $P_{10} - P_1$ value also in negative i.e. -0.009 and statistically insignificant. FF_3 factor model reflects P_1 value as 0.010 whereas P_{10} resulted in -0.003. Similarly, FF_5 factor model has P_1 and P_{10} values as 0.008. and -0.004 respectively. The level of spread has too a negative and statistically insignificant value. The overall results of equally weighted returns of portfolios was statistically insignificant through all three models. The Wald Test results of all three models indicate that there were cross-sectional changes in the equally weighted returns and therefore the results negate the hypothesis that

Table 1. Characteristics of Decile Portfolios

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	t-test
EW Excess Returns (% p.a)	0.24	0.31	0.27	0.25	0.29	0.34	0.34	0.26	0.27	0.41	0.17	0.25
VW Excess Returns (% p.a)	0.19	0.17	0.25	0.23	0.26	0.24	0.27	0.18	0.22	0.28	0.09	0.86
MV (Rs. mn)	0.129	0.035	0.034	0.063	0.085	0.122	0.146	0.277	0.348	0.862	0.733	17.54
CAPM	0.93	0.80	0.63	0.50	0.76	0.66	0.85	0.81	1.05	1.08	0.15	14.68

Table 2. Risk Adjusted Performance; Equally Weighted

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	wald-test
CAPM	0.004	0.010	0.009	0.009	0.009	0.012	0.012	0.004	-0.001	-0.005	-0.009	30.547
Alpha	(0.591)	(1.500)	(1.611)	(1.893)	(2.119)	(2.551)	(2.856)	(1.068)	(-0.364)	(-1.157)	(-1.309)	(0.001)
FF3	0.010	0.009	0.011	0.008	0.010	0.012	0.012	0.002	-0.002	-0.003	-0.014	20.625
Alpha	(1.301)	(1.119)	(1.577)	(1.302)	(1.895)	(1.940)	(2.332)	(0.340)	(-0.461)	(-0.608)	(-1.639)	(0.024)
FF5	0.008	0.010	0.012	0.012	0.002	-0.002	-0.003	-0.014	-0.002	-0.004	-0.012	30.00
Alpha	(1.302)	(1.895)	(1.940)	(2.332)	(0.340)	(-0.461)	(-0.608)	(-1.639)	(-0.500)	(-1.001)	(-1.640)	(0.000)

Table 3. Risk Adjusted Performance; Value weighted

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	wald-test
CAPM	-0.003	-0.002	0.008	0.009	0.006	0.006	0.005	-0.001	-0.003	-0.011	-0.008	19.270
Alpha	(-0.524)	(-0.278)	(1.542)	(1.824)	(1.273)	(1.346)	(1.217)	(-0.382)	(-0.685)	(-2.773)	(-1.295)	(0.037)
FF3	-0.001	0.001	0.011	0.007	0.008	0.004	0.005	0.000	-0.004	-0.009(-	-0.009	11.076
Alpha	(-0.094)	(0.097)	(1.643)	(1.133)	(1.280)	(0.676)	(0.901)	(-0.107)	(-0.672)	1.925)	(-1.150)	(0.035)
FF5	0.007	0.008	0.004	0.005	0.004	-0.004	-0.009	-0.009	-0.003	-0.012	-0.005	17.146
Alpha	(1.133)	(1.280)	(1.676)	(0.901)	(-0.107)	(-0.672)	(-1.925)	(-1.150)	(-0.680)	(-1.843)	(-1.111)	(0.088)

overall difference between the portfolio alphas was zero. We can conclude empirically that the result obtained from equally-weighted decile portfolios reveals that CAPM and FF₃ models explain the risk adjusted return if F-Score investment strategies were applied as Jensen alpha, FF₃ and FF₅ alphas for all three above investment strategies were negative and insignificant. These calculations were also based on three models i.e. Capital Asset Pricing Model (CAPM), Fama French three factor model (FF₃) and Fama French five factor model (FF₅). The monthly and annual figures of stock returns were the basis of calculations of F-Score. The above table reflects the value weighted risk adjusted performance of financial statement analysis and risk based investment strategies. The asset pricing models used for the estimation were CAPM, FF₃ and FF₅. The difference between P₁ and P₁₀ reveals the spread between two most extreme decile portfolios. The alpha however indicates the risk adjusted performance of F-Score based investment strategies. In the F-Score based analysis were reported using value weighted portfolios. The T-Statistics indicating the statistical significance of corresponding co-efficient at different levels of significance, these values have been shown in parenthesis. The results clearly indicate that CAPM alpha values of P₁ which contains low F-Score based firms has a value of -0.003 and P₁₀ which has high F-Score based firms has a value with negative sign i.e. -0.011. Further the P₁₀-P₁ value also in negative i.e. -0.008 and statistically insignificant. FF₃ factor model reflects P₁ value as -0.001 whereas P₁₀ resulted in -0.009. Similarly, FF₅ factor model has P₁ and P₁₀ values as 0.007 and -0.012 respectively. The level of spread has also a negative value and statistical insignificance. The overall results of value weighted returns of portfolios were statistically insignificant through all three models. The Wald Test results of all three models indicate that there were cross-sectional changes in the equally weighted returns and this rejects the hypothesis that there is no overall difference between the portfolio alphas. We can conclude empirically that the result of value-weighted decile portfolios shows that CAPM and Fama French three and Fama French 5 asset pricing models explain the risk adjusted premium for F-Score investment strategies as Jensen alpha and Fama French alphas for all three above investment strategies were negative and insignificant.

DISCUSSION, CONCLUSION AND RECOMMENDATION

Discussion and Conclusion: The principal objective of the study was to analyze the impact of F-Score on return of different companies

listed on PSX. Three models i.e. CAPM, FF₃ and FF₅ were used to explain this relationship. The results of the study revealed if beta was greater than 1, it shows high risk than the market, however the beta indicates less risk in most of the portfolios in our case of research. The CAPM showed the risk adjusted return of F-Score based sorted portfolios and their future direction. The analysis indicated that companies with low F-Score has a positive relationship and with high F-Score has a negative relationship but both were statistically insignificant. The FF₃ factor model also showed identical relationship between these two factors. Equally weighted and value weighted methods were used for obtaining results. It was concluded that F-Score sorted portfolio high ranked companies has high risky impact over returns whereas low F-Score companies return was less. The research study revealed that the abnormal return could not be generated in PSX, based on financial statement information (F-Score). The importance of T-Statistics could not be ignored as it reflects the confidence level of researcher about the results. It was also analyzed that the standard error, difference of estimated value and that hypothesized value as far as present research was concerned the value of T-Statistics was different in different empirical tests. It was negative for companies with low asset growth and positive for high asset growth firms under all models i.e. CAPM, FF₃ and FF₅ but statistically insignificant for majority of decile portfolios. It was further observed that the differential portfolio's (P₁₀ - P₁) return were negative and statistically insignificant. Hence, it can be concluded that the premium for F-Score investment strategies were not available in Pakistan equity market, since the CAPM and Fama-French models were robust enough to capture the abnormal profitability generated through F-Score.

The positive F-Score criteria give individual investors and companies a strategy to take advantage for better return and growth rate. The criterion was very useful for better understanding of risk and return. The one of the hurdles that was faced in research process was rapid change in the behavior of PSX. It is suggested that factors behind their unpredictable behavior may be studied in detail to have clean insight of risk and return relationship. This is also necessary to give a clear conclusion of the research, since the research process was very lengthy, technical and tedious. The factors which can be considered as important in the risk and return relationship is co-efficient of correlation and beta. The three models that have been used to estimate these factors are actually very helpful in computing this relationship. The CAPM captured the beta very effectively only the need is to be ensured the reliability of data. The source of data must be authentic (Mankiw 1985). The conclusion/results of data indicated that high F-

Score based companies have the positive co-efficient of correlation where as low F-Score based companies have the same relation as negative. The investor intends to invest in the market should have to understand the increasing importance of F-Score criteria. They will have optimistic opportunities of positive returns if they utilize the criteria besides having an understanding of economic and environmental ups and down.

Recommendations: Pakistan is having good and stable environment as far as confidence of investors and future of investment is concerned. It is therefore very important to study various techniques which have impact on risk and return and on their relationship. F-Score sorting portfolio technique is one of them. The accuracy of data is also not up to mark due to certain economic and political conditions of Pakistan. The sudden ups and down in the stock creates issues of data accuracy. The circumstances are uncontrollable and required to be thoroughly studied so that impact of F-Score factor on stock can properly be checked.

Keeping in view all above factors some of the recommendations are as under:

Before conducting any research, the political and economic conditions of the country should thoroughly be studied so that proper steps should be followed for successful results. The time of instability required to be studied separately in order to ascertain the behavior of the market and its further effects on risk and return relationship. The separate testing of F-Score sorted portfolio method for both stable and instable periods can provide an insight which can help in decision making under different circumstances. In this way the financial position of Pakistan Stock Exchange should also be studied on same lines. Since time series data analysis technique has been used therefore, any abnormal variation due to economic or political disturbance may distract the reliability of the results. Therefore, it is also recommended that period of political and economic instability may be studied separately by using the F-Score sorting portfolio method. In this way we can also predict future unstable period strategy for the facilitation of investors.

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