

Value Investment Strategies and Asset Pricing: A Case of Pakistan Stock Exchange (PSX)

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ABSTRACT

The Capital Asset Pricing Model (CAPM) measures only a linear relationship between the Risk and the Return. However, market dynamics and anomalies calls for understanding the relationship in between risk and return from non-linear perspective. Thus, current study explores an opportunity to study asset value anomalies by Constructing Decile Portfolio for the period starting from 2001 to 2018 with 900 firms listed. GMM (Generalized method of moment and Wald test are applied to see the robustness of results. For further analysis, Risk Adjusted CAPM, Fama French 3 Factor (FF3) and 5 Factor (FF5) are applied. Empirical results indicate that value effect and debt to equity ratio are essential factors and genuinely explain what CAPM fails to explain. The findings from the study recommend that investing in High value and high leverage firm will generate abnormal returns to investors. Taking long position in high value firm and short position in low value firms and same with debt to equity anomaly. The results will help financial analyst develop investment strategies for well diversified and efficient portfolios. These results can also be helpful to financial firm and security analyst in the financial market where they can take appropriate capital budget decisions while investing.

JEL Classification: G11, G12, G14

Keywords: Value Investment, Stock market, Anomaly, Asset Pricing, CAPM, PSX

INTRODUCTION

The changes in financial and economic models are the instrument of changes in economic dynamic and behavior of every nation (Dieci, He & Hommes 2014; Escavy, Herrero, Trigos & Sanz-Pérez 2020). The behavior of financial institution such as the stock market is an important entity where effects of such changes are observed (Liyanapathirana & Ranasinghe, 2020; Timmer, 2018). The literature strongly supports that, changes in economic and financial model is always non-linear (Dieci et al., 2014). Thus, management of such changes at stock market has always remained a problem faced by scholars (Wandera, 2014). The literature has concluded that, one most pressing issues faced due to changes in stock market behavior from changes in economic and financial model is market anomaly (Ahmed, Mahmood & Islam, 2016; Camba, 2020) which is generally referred to as abnormalities, whereas in financial literature, anomalies are cases in which shares Price or the entire stock market behave in random order, which are not justified by any financial theory (Jebran & Chen, 2017). The literature has further argued that, existence of market anomaly will continue to cast doubt over effective performance of stock market (Markowitz, Guerard, Xu & Beheshti, 2021 and Rossi & Fattoruso, 2017). To deal with

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such anomaly, term ‘efficient market’ was introduced initially which according to Malkiel and Fama (1970) refers to “those markets wherever the security prices represent the complete given statistics that is available and there are no unfair profits”. Further, Jensen (1978) argued that “*a market is known as efficient when there are no opportunities for people to gain unfair profits and returns*”. So according to efficient market hypothesis (EMH), there is no opportunity for a shareholder to gain the greatest return over average market returns, if all available information is expressed in the security prices (Rossi & Gunardi, 2018 and Singh, Babshetti & Shivaprasad, 2021). For many years, scholars have accepted the idea of an efficient market hypothesis. However, existence of stock market phenomena influenced the subjectivity of the efficient market theory, hence; investigators noted that there is no standard model that could justify stock market abnormal behaviors (Gao & Wang, 2021).

To deal with stock market abnormal behaviors a modern portfolio theory was developed (Markowitz, 1952). The portfolio theory gave birth to range of asset price theories and popular among them is referred as capital asset pricing model (CAPM) developed by Linter (1965), Mossin (1966), Sharpe (1964) and Treynor (1961). The model identifies two kind of risk; unsystematic which can be removed through diversification and systematic risk which is not diversifiable. The CAPM throughout a time has evolved to deal with systematic risk as Fama and Macbeth (1973) has argued that, “*Any variation in the return of a security is only because of systematic risk*”. This model suggests the asset return is a result of its non-diversifiable risk defined by beta (β). Only market risk or β is the main risk factor present in the stock market. Frazzini and Pedersen (2014) describe several other phenomena that are determined in stock markets but it can’t be defined via market beta, a degree of profit elasticity that changes in market risk premium, thus; identified as market anomaly (Nurwulandari, 2021). An anomaly is a mechanism that is incompatible with existing asset-price conduct models in average stock returns. Every type of experiential assessment of anomalies needs a standard model of the price formation process. A portfolio-based method is frequently used to identify anomalies (Nakano, Takahashi & Takahashi, 2017).

The financial leverage is an activity to use debt to finance assets of company (Brigham & Houston, 2021). The leverage is considered as the basic source of financial distress for companies which may ultimately leads towards bankruptcy. Irrespective the importance of leverage in financing the businesses and their related various financial risks, financial leverage remains a poorly discussed topic in the studies of asset pricing and literature is missing in this regard (Li, Li & Zeng, 2020). As with the passage of time, the capital structure start utilizing higher financial leverage, therefore, Modigliani and Miller (1958) recommended that there should be increased in the expected return on equity. This was further justified by Hamada (1969), who merged the work of Modigliani and Miller that indicated that a rise in financial leverage will lead to the rise in the beta of the firm. Hence, if CAPM holds, the beta coefficient will detect financial risk from leverage and thus eliminate the use of a distinct factor that is risk premium. Bhandari (1988) proposed that leverage should be included in stock returns and financial risk premium should be considered as a self-determining risk factor in the model. Then, Fama and French (1992) considered failure of CAPM’s and questioned value of beta to fully capture variations in stock returns. A rise in leverage transmits the financial markets with mixed signals. On the other hand, this stated that leverage opens the potential investment avenues for the company and funded it by debt acquisition, but on the contrary, the rise in debt could put distress on the financial structure and raise the financial risk of the company.

Given the value of financial leverage or capital mix, the position of leverage with asset pricing is limited in literature and exhibits various financial anomalies that are still undiscovered and unquestioned.

Moreover, in the financial world dividend policy also plays the challenging role for the academicians and researchers (Allen & Michael, 1995). There are two major questions which are important to answer regarding dividend policy include: first, whether or not a firm's dividend has any effect on the stock market volatility? The second effect dividend on the stock prices in the long run? However, given importance of dividend policy on asset price, literature especially empirical regarding to this question and dividend policy relation with asset price is highly limited (Arslan, Zaman & Phil, 2014). This Research will emphasize on particular type of financial anomaly i.e., "*Investment Value Anomalies*". This implies, "companies that experienced high value effect, high dividend yield and high debt-to-equity ratio enjoyed higher returns (Marisetty, 2020). Furthermore, in an efficient market, suspected companies are commonly known to have high earnings and improved prospects integrated into their existing share prices, allowing further investments.

Therefore, this research will put light on to investigate any consistent pattern in Pakistan stock market by analyzing the investment value Anomalies not yet investigate in Pakistan. Thus, current study will be underlying by using three different Models such as the CAPM model, Fama-French three factor model and Fama-French five factor model to test public firms' profitability. Even though this study does not conduct any direct analysis of market competence and effectiveness, it does provide suggestion whether or not there is an investment value anomaly be present in Pakistan Stock Exchange (PSX). For this reason, this work provides investors with empirical evidence in their investment selection decisions about the efficiency of the impact of asset value. The rest of paper is literature review, research methodology, data analysis and conclusion.

LITERATURE REVIEW

Lintner (1965), Markowitz (1952), Mossin (1966) and Sharpe (1964) devised this as Capital Asset Pricing Model (CAPM). CAPM measures expected return that compensates an investor by means of taking systematic hazard. CAPM focuses on only one factor that highlighting a single source of systematic risks i.e., market risk (Hakim, Hamid & Meera 2016). The empirical proof on the estimation of the CAPM though was inconclusive. At the same time, the CAPM research literature has reported a number of CAPM anomalies that lead to concerns that beta is the only valid systemic risk measure. Anomalies are experimental findings that tend to be incompatible with established asset-pricing behavior theories. They either imply market incompetence or short comings in the underground theories of asset pricing model (Hens & Naebi, 2021; Pandey & Joshi, 2021; Rakhyani, 2021; Rojo-Suárez, Alonso-Conde & Ferrero-Pozo 2020).

Several empirical studies have examined market anomalies correlated with cross-sectional stock returns, such as accruing profitability, price momentum, and stock value (Fama & French, 2006; Vincent, Hsu & Lin, 2020), size anomaly (Banz, 1981; Muns, 2019), stock market value anomaly (Close & Kashef, 2020; Rosenberg, Reid & Lanstein, 1985) and equity debt anomaly (Bhandari, 1988; Chordia, Goyal, Nozawa, Subrahmanyam & Tong, 2017). Fama and French (2015) suggest an empirical framework, any other pricing technique compared to conventional

and theoretical CAPM, in response to evidence of a few anomalies within the market place and few different threat orientated elements instead of marketplace beta. Fama and French (1995) note that stock hazard needs to be pretty priced, because it is a multidimensional problem and finish 3 big risk aspect that have been shown to persuade stock constantly, i.e., market risk premium, therefore, the following model is then known as the Fama-French Three-Factor Model.

This includes a β (beta) is similar with the beta used in previous models but this beta shows bit high impact as compare to the previous one because it contains two other factors. The first factor size used SMB that is “small minus big” return as its proxy to calculate the market capitalization. The second factor value effect is measured through HML represents “high minus low” Which is the shareholder’s view of business prospects as reflected in the book-to-market ratio and this is the return on stock portfolio of high book-to-market ratio minus low book-to-market return on stock portfolio. In the context of the three-factor method, another study was conducted in the US context by Vassalou and Xing (2004), who studied the pricing of default risk for US securities. The findings indicate that both default risk and financial distress are naturally systemic and expressed in terms of equity returns. In the empirical capital market study, this model has earned name as a benchmark model of that time. Nartea, Gan and Wu (2008) explained that in the sample, successful 90 percent of portfolio findings are expressed by the generalization of Fama-French three-factor model, compared with only 70 percent expressed by CAPM particularly. There are rational reasons that helped to assess stock returns for these factors. Novy-Marx (2013) stated that the book-to-market ratio is concerned with troubled facing companies with weak prospects, poor financial performance, volatile profits, and bad management. The more volatile the businesses are; it is possible that higher returns will reward shareholders.

Moreover, Carhart (1997) suggests another pricing model known as four-factor model that shows resistance to the momentum effect priced independently from the FF model’s three factors. Titman, Wei and Xie (2013) state how productivity and investment are linked to global returns. Thus, Novy-Marx (2013) suggests that productivity has the same explanatory power as the value effect. Considering all these results, Fama and French (2015) suggested a new model known as five-factor model that results substantially well in the predictability of average stock returns. In comparison, the cost factor of FF’s three-factor system is inefficient without pricing the average returns on the low value of stocks. Then the liquidity factor was introduced and added to the five-factor FF model (Racicot & Rentz, 2016) and reported that the remaining variables, including volatility, were negligible in return predictability except for the market portfolio. In addition, by examining the performance of CAPM, three-factor FF, and five-factor FF models, it is noted that there is the association between risk and return (Singh & Yadav, 2015). Capital asset pricing is an emerging field and lots of studies are in process which explains different dimensions and behavior of capital asset pricing models. In this regard, following the recent work of many researchers regarding the capital asset pricing, it is clearly visible that a number of different anomalies emerge in this field which show significant contribution to the predictability of returns. These anomalies were presented by various academicians and researchers such as in the study conducted by Hou, Xue and Zhang (2015), they mention about 80 anomalies out of 80, around 40 anomalies are not showing significant results in the large cross-sectional average returns on stocks.

METHODOLOGY

The research methodology of current research is based quantitative research design where data to empirically validate the theory and model is obtained from publicly listed companies in Pakistan Stock Exchange (PSX), and Thomson Reuter's data stream within the observation period of 2001-2018. The sample will not contain financial firms because of their different Capital Structure, rules and regulations. Likewise, in order to be saving from survivorship bias, all listed and delisted companies will have encompassed in the data set.

Research Procedure

Portfolios are more acceptable than individual base stock returns, because individual base stock returns entail complex company-specific disruption creating barriers to the detection of predictable patterns, Campbell, Lo and MacKinlay (1997). Through constructing portfolios, however, it can be easily addressed. Portfolio has the lowest residual volatility as a result of which its betas are strengthened compared to single base stock betas and are more relatively stable in the case of uncertainties or market size changes, further single sorting approach will be implemented. In which, all stock returns will be taken on monthly basis and sorted according to the criteria related to asset value ratio where each stock will be taken annually and then stock returns will be arranged in ascending order. After that, market value of each stock will be ordered on monthly basis in order to determine the portfolio returns on decided time period. Then portfolios will be divided into group of deciles ranging from low to higher value of asset and determined as P1 to P10. After all this sorting, both categories of returns i.e., equally weighted and value-weighted will be generated in order to test the validity of all constructed portfolios (Shaikh & Kashif, 2017). Further to tackle autocorrelation and heteroscedasticity problem GMM used. Lastly Wald test (Chi Square) used how those estimated parameters are away from Zero Value (Null hypothesis). The significance of test shows overall testing model eligibility in research and Identify either these anomalies exist or not within given period of Data.

Value Effect

Thus, this paper expressed value effect through the following equation:

$$BEME_t = \frac{BE_{t-1}}{ME_{t-1}} \quad (1)$$

BE (t-1) represents the equity's book value on the end of the every economic yr (t-1) whereas ME_(t-1) represents the fair marketplace price on the end of the each financial yr (t-1). In order to qualify the selective standards and to be part of the pattern, a company must need to have a data of at time period (t-1).

Ratio of debt to Equity

$$DER = \frac{(BV_{TA} - BV_{CS})}{MV_{CS}} \quad (2)$$

Where BVTA represents the "Book Value total Asset," BVCS is the "BV Common Equity " and MVCS is the "Market Value Common Equity" Decile share portfolios will be generated at the end of each fiscal year (t) based on DER as the PSX classification criterion.

Dividend Yield

$$DY_t = \frac{\sum_{t=12}^{t-1} DIV_t}{P_{t-13}} \quad (3)$$

In the above mention equation, (DIV) represents the total of common dividends paid in the months which is then divided by the price (P_{t-13}) of the stock, before going further, the basic challenge of zero value of dividend yield will have to be resolved. For this purpose, a filtering test will be conducted on the given criteria of Christie (1990) and McManus, Gwilym and Thomas (2004).

Research Design

The current research design is based upon quantitative and empirical in nature. The research has attempted to explore the effect of financial leverage, value effect and divided payout policy on the asset pricing in Pakistan stock exchange (PSX). Further, present research is explanatory in the nature and mono-quantitative method is followed. In order to fulfill the purpose have collected the data through Thomson Reuters Data Stream and Pakistan Stock Exchange (PSX). The assortment of the time period duration is grounded upon the availability of data and over the consequences of organized portfolios. The unit of analysis is Pakistan Stock Exchange (PSX) all index, both listed/delisted companies. The reason to incorporate both listed/delisted is to avoid the survivorship biasness (Kostakis, Kashif & Siganos, 2011).

Data Collection Method

The data of Investment value anomalies of all the companies listed/delisted will be obtained from the well-renowned database i.e. Thomson Data stream and the data of stock returns will be collected from the PSX official website, In addition, risk-free rate will be obtained from Karachi Inter Bank Offer Rate (KIBOR) on monthly basis from time period ranging from 2001 to 2018. Sample Data taken from Thomson Data Stream and each variable has particular Mnemonic code such as the code of common equity is (WC03501), book-to-market value of equity (WC02649), total assets (WC02999) and Common dividend (DIV) is (WC05376).

Dependent Variable

- R_i , is the return of sorted portfolio in t month, minus $R_t f$ is risk free return which is identify through (KIBOR)

Independent Variable

- $R_t f$ is the month t risk-free rate captured by KIBOR,
- R_m is the market portfolio return captured by Karachi Stock Exchange all index
- $(R_m, - R)$ is the month t excess market portfolio return.
- R_m (market return).

DATA ANALYSIS AND FINDINGS

This section begins with Decile Portfolios Create on the grounds of single sorting by Value effect (Book to Market) Ratio as reported in Table 01, Dividend Yield reported in Table 04 and Debt to Equity Ratio reported in Table 07. Furthermore, the Decile Portfolio Constructions are followed by risk adjusted asset pricing model for each of the portfolio by CAPM, FF3 and FF5.

In Table 01, Portfolio 01 (P1) represents lowest yield on the going by sorting anomaly (Book to Market Ratio), Dividend Yield in Table 04 and Debt to Equity Ratio in Table 07. Whereas, (P10) represents highest yield with same sorting criteria. The data set sample for the study is taken from the year 2001 to 2018. To check whether the extreme portfolios behave differently or not, the study used the t-test to the differences between P10 (Decile Highest Portfolio) and P1 (Decile Lowest Portfolio). The returns of Equally-Weighted (EW) and Value-Weighted (VW) are taken as annualized monthly returns of portfolio. The results of returns in VW and EW suggest more monotonically increasing returns patterns among all portfolios from P1 to P10 and it also shows the substantial variations across the portfolio that indicated Value Portfolio and Debt to Equity are significant criterion.

Value Effect (Book to Market)

Table 1 results show that P10 has highest yield in Equal Weighted and Value Weight portfolio which is 0.41% and 0.27% with lower beta i.e., 0.73. However, according to the mean variance model low beta should have low returns (no trend found in corresponding beta based on CAPM). The spread between (P10 to P1) in EW and VW is 0.08% and 0.08% respectively and t value is (2.16) and (2.82) which are statistically significant in both equal weighted and value weighted decile portfolios. Our results are in line with the findings of Graham and Dodd (1934) in which they concluded that portfolio which has high book to market ratio value has higher yield compare to the low book to market portfolios.

Table 1:

Characteristics of Decile Portfolios based on Value

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	t-test
EW Excess Returns (% p.a)	0.33	0.34	0.29	0.29	0.34	0.27	0.3	0.27	0.38	0.41	0.08	2.16**
VW Excess Returns (% p.a)	0.19	0.18	0.23	0.22	0.21	0.22	0.22	0.25	0.25	0.27	0.08	2.82***
MV (Rs. mn)	0.393	0.198	0.229	0.109	0.186	0.168	0.127	0.008	0.007	0.002	-0.391	-2.55**
CAPM β	0.82	0.81	0.74	0.67	0.64	0.77	0.72	0.74	0.73	0.73	-0.09	-44.75

*The above table represent of decile portfolios create on the grounds of sorting criteria of Value (Book to market ratio) based anomaly from the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock exchange (PSX), they have been sorted in ascending order by annualized month wise returns. The decile portfolio excess returns were post ranking returns that computed at Month t+1. 10 Portfolio are generated on the basis of Value (Book to market ratio) anomaly. Portfolio 10 (High value) and Portfolio 1 (Low value). Portfolio are comprised on the basis of Equal Weighted (EW) and Value Weighted (VW) and their returns are in percentage form. P10-P1 denotes the spread between P10-P1. MV shows the market value of each share's portfolio in PKR. The above table also posts CAPM beta which show riskiness of Portfolio. In the end, the t-test shows the significance of the null hypothesis which is that there is no difference in mean of characteristics between portfolios. Moreover, asterisks denote the significant level; * = 1% level of significance; ** = 5% level of significance; and *** = 10% level of significance.*

The Table 2 presents the Jensen alpha (CAPM) of Decile Portfolio (P10-P1) for the sample period of (2001 to 2018). The CAPM Jensen alpha (P10-P1) shows high positive yield i.e., 15.52% with the t-statistic value of 2.20 (significant at 5% and 1%), these results somehow support the value (Book to market ratio) anomaly. Furthermore, Wald test value clearly implies in equally weighted portfolio that there is an existence of cross sectional variation in returns as they are significant at 5% and 10% significant levels. Hence, we can claim that Value (book to

market ratio) Anomaly exist in Pakistan Stock Exchange (PSX). Moreover, FAMA & FRENCH (Three and Five factor) model also support the similar and spread (P10- P1) is 12.60 and 11.57 with t value of 1.81 and 1.75 (significant at 10%). These results provide evidence that Value (Book to market ratio) anomaly exist in (PSX) through the application of equally weighted portfolio with risk adjustment.

Table 2:

Jensen Alpha of Equally Weighted (EW) Asset Growth Portfolio

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	Wald-Test
CAPM Alpha	1.67	0.26	4.79	4.39	2.67	6.31	5.64	6.59	5.52	17.19	15.52	11.44
	-0.25	-0.05	-1.06	-0.99	-0.56	-1.42	-1	-1.12	-0.89	(1.98)**	(2.20)**	0.03**
FF3 Alpha	4.31	2.34	6.45	3.31	3.73	5.89	6.41	5.5	8.75	16.91	12.6	8.93
	-0.52	-0.41	-1.15	-0.6	-0.63	-1.06	-0.9	-0.76	-1.18	-1.58	(1.81)*	0.05*
FF5 Alpha	5.73	2.87	6.55	5.24	5.38	5.58	6.49	7.6	11.95	17.31	11.57	10.83
	-0.65	-0.47	-1.11	-0.9	-0.86	-0.95	-0.87	-1.01	-1.54	-1.54	(1.75)*	0.03**

*The above table represents risk adjustment performance of Decile Portfolios create on the grounds of sorting criteria of Value (Book to market ratio) based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock Exchange (PSX), they have been sorted in ascending order by annualized month wise returns. Value (Book to market ratio) anomaly represents that decile Portfolio 10 (P10) has highest positive value and Portfolio 1 (P1) has lowest positive value. Portfolio are comprised on the basis of Equal Weighted (EW) and their returns are in percentage form. (P10-P1) denotes the spread of portfolio. CAPM Alphas, FF3 Alphas, FF5 Alphas represent Annualized Estimation Alphas which is calculated by using CAPM, FAMA and FRENCH Three and Five factor model. The p-values are reported in parentheses [] indicating significant level at 1%, 5% and 10 % which are represented as *, **, *** respectively and in the end the Wald test is used for analysis, the null hypothesis is that all ten-decile portfolio are jointly equal to zero.*

The table 3, shows Jensen Alphas of Value weighted (VW) portfolio that are constructed on the basis of Value (Book to market ratio) anomaly. After the adjustment of risk factors, the results in table 03 remains intact and shown that book to market ratio is priced in PSX over and above FAMA 5 Factor model factors, the difference between (P10-P1) For CAPM, FAMA & FRENCH (Three and Five factor) model annualized yield is 16.29%, 14.30%, and 10.13% respectively. The overall result is statistically significance for estimated alphas using Wald test, so we can reject the null hypothesis which implies that the jointly they are equal to zero. It can be inferred that the Value Anomaly exist in PSE and hence it can be concluded that the decile portfolio that are generated on the value anomaly also generate abnormal returns hence proving that High Value (book to market) anomaly should be cautious by investor to invest in PSX. Our results are in line with findings of Roll (1977) in which he explained that CAPM only capture single asset returns in a market proxy for defining risk return relationship, where market portfolio could be combination of different factors.

Table 3:*Jensen Alphas of Value-Weighted (VW) Portfolios – Value*

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	Wald-test
CPM Alpha	11.81 (1.92)*	12.34 (2.26)**	8.71 (2.10)**	10.89 (2.35)**	13.25 (3.05)***	9.84 (2.24)**	6.98 (1.59)	7.75 (1.94)**	2.46 (0.75)	28.10 (5.40)***	16.29 (2.15)**	69.01 0.00***
FF3 Alpha	4.30 (1.75)*	13.71 (2.04)**	9.23 (1.77)*	13.71 (2.39)**	14.85 (2.73)***	11.46 (2.14)**	8.28 (1.52)	5.69 (1.15)	1.11 (0.27)	18.60 (4.55)***	14.30 (1.99)**	52.46 0.00***
FF5 Alpha	8.22 (1.77)*	16.42 (2.34)**	9.16 (1.65)*	13.89 (2.29)**	15.66 (2.73)**	12.42 (2.22)**	9.18 (1.61)	5.94 (1.14)	1.27 (0.29)	18.35 (4.19)***	10.13 (1.72)*	50.53 0.00***

Above table represent risk adjustment performance of Decile portfolios create on the grounds of sorting criteria of Value (Book to market ratio) based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock exchange (PSX) and they been sorted in ascending order by annualized month wise returns. Value (Book to market ratio) anomaly represents that decile Portfolio 10 (P10) has highest positive value and Portfolio 1 (P1) has on average low positive value. Portfolio are comprised on the basis of Value Weighted and their returns are in percentage form. (P10-P1) denotes the spread of portfolio. CAPM Alphas, FF3 Alphas, FF5 Alphas represent Annualized Estimation Alphas which is calculated by using CAPM, FAMA and FRENCH Three and Five factor model. The p-values are reported in parentheses [] indicating significant level at 1%, 5% and 10 % which are represented as *, **, *** respectively and in the end the Wald test is used for analysis, the null hypothesis is that all ten-decile portfolio are jointly equal to zero.

Dividend yield

Table 4 reports the results are insignificant at all levels (EV and VW). The spread of portfolio (P10–P1) of value weighted and equally weighted returns is 0.08% and 0.02% respectively but they are statistically insignificant. Hence, our study fails to find a relationship between the dividend yield and return.

Table 4:*Characteristics of Decile Portfolios based on Dividend Yield*

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	t-test
EW Excess Returns (% p.a)	0.33	0.28	0.27	0.23	0.28	0.20	0.30	0.30	0.24	0.41	0.08	0.24
VW Excess Returns (% p.a)	0.25	0.20	0.22	0.13	0.29	0.11	0.24	0.23	0.14	0.27	0.02	0.06
MV (Rs. mn)	0.059	0.103	0.178	0.356	0.245	0.256	0.183	0.192	0.310	0.263	0.204	13.78
CAPM β	1.21	0.92	0.90	0.65	0.92	0.83	0.88	0.91	0.79	0.88	-0.33	-21.11

The above table represent of Decile portfolios create on the grounds of sorting criteria of Dividend yield-based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock exchange (PSX) and have been sorted in ascending order by annualized month wise returns. The decile portfolio excess returns were post ranking returns that computed at Month $t+1$. Dividend yield anomaly assigned to 10 portfolios represent that Portfolio 10 (High value) and Portfolio 1 (Low value). Portfolio are comprised on the basis of equal weighted and Value weighted and their returns are in percentage form. P10-P1 denotes the spread between P10-P1. MV shows the market value of each share's portfolio in PKR. The above table also Mention CAPM beta which show riskiness of Portfolio. In the end, the t-test shows the significance of the null hypothesis which is that there is no difference in mean of characteristics between portfolios.

The table 5 represents Equal Weighted alphas portfolio constructed on the basis of the Dividend Yield, the spread between (P10 –P1) in CAPM alpha of dividend yield is 15.58% statistically significant with t-statistic value of 1.75. Whereas, FAMA & FRENCH (three and five factor) models' alpha of dividend yield is 13.63% and 17.51% respectively. Furthermore, the Wald

test, to evaluate the significant of all assets pricing models (CAPM, FF3, and FF5), results show statistical significance at 5%, therefore, we reject the null hypothesis.

Table 5:

Jensen Alphas of Equally-Weighted (EW) Portfolios – Dividend Yield

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	Wald-Test
CAPM Alpha	11.81 (1.92)*	12.34 (2.26)**	8.71 (2.10)**	10.89 (2.35)**	13.25 (3.05)***	9.84 (2.24)**	6.98 -1.59	7.75 (1.94)**	2.46 -0.75	28.1 (5.40)***	16.29 (2.15)**	69.01 0.00***
FF3 Alpha	4.3 (1.75)*	13.71 (2.04)**	9.23 (1.77)*	13.71 (2.39)**	14.85 (2.73)***	11.46 (2.14)**	8.28 -1.52	5.69 -1.15	1.11 -0.27	18.6 (4.55)***	14.3 (1.99)**	52.46 0.00***
FF5 Alpha	8.22 (1.77)*	16.42 (2.34)**	9.16 (1.65)*	13.89 (2.29)**	15.66 (2.73)**	12.42 (2.22)**	9.18 -1.61	5.94 -1.14	1.27 -0.29	18.35 (4.19)***	10.13 (1.72)*	50.53 0.00***

Above table represent risk adjustment performance of Decile portfolios create on the grounds of sorting criteria of Dividend Yield based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock exchange (PSX) and they have been sorted in ascending order by annualized month wise returns. Dividend Yield anomaly represents that decile Portfolio 10 (P10) has highest positive value and Portfolio 1 (P1) has lowest positive value. Portfolio are comprised on the basis of equal weighted and their returns are in percentage form. (P10-P1) denotes the spread of portfolio. CAPM Alphas, FF3 Alphas, FF5 Alphas Represent Annualized Estimation Alphas which is calculated by using CAPM, FAMA and FRENCH Three and Five factor model. The p-values are reported in parentheses [] indicating significant level at 1%, 5% and 10 % which are represented as *, **, *** respectively and in the end the Wald test is used for analysis, the null hypothesis is that all ten-decile portfolio are jointly equal to zero.

The Alpha results of Value weighted (VW) in dividend yield portfolio fails to explain any significance level to most of the asset pricing model such as CAPM, FAMA & FRENCH (Three and Five) Model. The results show that dividend yield is not priced in PSX. The spread of all 3 asset pricing model (P10-P1) annualized yield and alphas are 8.46% with 0.94 t-statistic, 9.88% with 0.88 t-statistic and 13.68% with 0.46 t-statistics. Hence, it can be concluded that decile portfolio that are based on dividend yield does not have abnormal yield and we fail to conclude, that risk premium can generated by investing in those portfolios that has higher dividend yield in PSX.

Table 6:

Jensen Alphas of Value-Weighted (VW) Portfolios – Dividend Yield

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	Wald-Test
CAPM Alpha	11.81 (1.92)*	12.34 (2.26)**	8.71 (2.10)**	10.89 (2.35)**	13.25 (3.05)***	9.84 (2.24)**	6.98 -1.59	7.75 (1.94)**	2.46 -0.75	28.1 (5.40)***	16.29 (2.15)**	69.01 0.00***
FF3 Alpha	4.3 (1.75)*	13.71 (2.04)**	9.23 (1.77)*	13.71 (2.39)**	14.85 (2.73)***	11.46 (2.14)**	8.28 -1.52	5.69 -1.15	1.11 -0.27	18.6 (4.55)***	14.3 (1.99)**	52.46 0.00***
FF5 Alpha	8.22 (1.77)*	16.42 (2.34)**	9.16 (1.65)*	13.89 (2.29)**	15.66 (2.73)**	12.42 (2.22)**	9.18 -1.61	5.94 -1.14	1.27 -0.29	18.35 (4.19)***	10.13 (1.72)*	50.53 0.00***

Above table represent risk adjustment performance of Decile portfolios create on the grounds of sorting criteria of Dividend Yield based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on

Pakistan Stock Exchange (PSX) and they have been sorted in ascending order by annualized month wise returns. Dividend Yield anomaly represents that decile Portfolio 10 (P10) has highest positive value and Portfolio 1 (P1) has lowest positive value. Portfolio are comprised on the basis of Value weighted and their returns are in percentage form. (P10-P1) denotes the spread of portfolio. CAPM Alphas, FF3 Alphas, FF5 Alphas Represent Annualized Estimation Alphas which is calculated by using CAPM, FAMA and FRENCH Three and Five factor model. The p-values are reported in parentheses [] indicating significant level at 1%, 5% and 10 % which are represented as *, **, *** respectively and in the end the Wald test is used for analysis, the null hypothesis is that all ten-decile portfolio are jointly equal to zero.

The Alpha results of Value weighted (VW) in dividend yield portfolio fails to explain any significance level to most of the asset pricing model such as CAPM, FAMA & FRENCH (Three and Five) Model. The results show that dividend yield is not priced in PSX. The spread of all 3 asset pricing model (P10-P1) annualized yield and alphas are 8.46% with 0.94 t-statistic, 9.88% with 0.88 t-statistic and 13.68% with 0.46 t-statistics, the overall significance of estimated alphas through the Wald test is insignificant. Hence results prove that dividend yield is not priced above market, value, size, profitability and investment.

Debt to equity

The table 7 results show that portfolio P10 has higher yield in both value weighted and equal weighted portfolio i.e., 0.41% & 0.27% respectively with low beta of 0.72. Whereas, P1 has lower yield in both Equal weighted and Value weighted i.e., 0.33% and 0.20% respectively with higher beta of 1.24. Moreover, the spread yield of (P10-P1) is 0.08 and 0.07 with t value of (2.17) and (1.65) respectively. They are statistically significant at 5% and 10% level. It can be inferenced that the investor will earn risk premium by investing in the portfolios which has high debt to equity ratio. These results are similar and in line with the finding of Bhandari (1988) in which he proposed higher the debt/equity ratio higher the return.

Table 07:

Characteristics of Decile Portfolios based on Debt to Equity

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	t-test
EW Excess Returns (% p.a)	0.33	0.28	0.27	0.23	0.28	0.20	0.30	0.30	0.24	0.41	0.08	0.24
VW Excess Returns (% p.a)	0.25	0.20	0.22	0.13	0.29	0.11	0.24	0.23	0.14	0.27	0.02	0.06
MV (Rs. mn)	0.059	0.103	0.178	0.356	0.245	0.256	0.183	0.192	0.310	0.263	0.204	13.78
CAPM β	1.21	0.92	0.90	0.65	0.92	0.83	0.88	0.91	0.79	0.88	-0.33	-21.11

The above table represent of Decile portfolios create on the grounds of sorting criteria of Debt to Equity ratio based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock Exchange (PSX) and they have been sorted in ascending order by annualized month wise returns. The decile portfolio excess returns were post ranking returns that computed at Month t+1. 10 portfolios are generated on the basis of Debt-to-equity ratio anomaly Portfolio 10 (High value) and Portfolio 1 (Low value). Portfolio are comprised on the basis of equal weighted and value weighted and their returns are in percentage form. (P10-P1) denotes the difference between (P10-P1). MV shows the market value of each share's portfolio in PKR. The above table also mention CAPM beta which show riskiness of portfolio. In the end, the t-test shows the significance of the null hypothesis which is that there is no difference in mean of characteristics between portfolios.

The Table 08 CAPM Jensen alpha (P10-P1) shows high positive yield of 17.99% with t-statistic value of 2.47 which is statistically significant at 5% and 10%. The results reported somehow supported the idea that it exists the debt to equity anomaly. Moreover, the Wald test value clearly elaborate in equally weighted portfolio that their existence in cross sectional is variation returns as their p-values are found significant. In addition to this, the spread of P10- P1 for FF3 alpha and FF5 alpha is 16.58 and 26.14 respectively at 5% significance level. These results strongly evidence that debt to equity anomaly exist in Pakistan stock exchange.

Table 08:

Jensen Alphas of Equally-Weighted (EW) Portfolios – Debt to Equity

CAPM Alpha	17.17	19.42	13.39	8.06	17.45	2.49	5.80	-1.67	5.03	-0.82	17.99	38.50
	(3.19)***	(2.49)**	(2.70)***	(1.72)*	(3.22)***	(0.44)	(0.99)	(-0.21)	(0.58)	(-0.08)	(2.47)**	[0.00]***
FF3 Alpha	19.08	16.32	12.62	8.73	16.95	3.30	2.18	2.00	7.30	2.50	16.58	24.83
	(2.92)***	(1.71)*	(2.01)**	(1.51)	(2.49)**	(0.47)	(0.27)	(0.21)	(0.70)	(0.19)	(2.13)**	[0.01]**
FF5 Alpha	21.26	18.43	15.05	8.75	19.78	3.39	-0.62	-1.42	3.84	-2.25	26.14	28.54
	(3.11)***	(1.83)*	(2.30)**	(1.42)	(2.79)***	(0.46)	(-0.08)	(-0.14)	(0.35)	(-0.16)	(2.47)**	[0.00]***

Above table represent risk adjustment performance of Decile portfolios create on the grounds of sorting criteria of Dividend yield-based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock Exchange (PSX) and they have been sorted in ascending order by annualized month wise returns. Portfolio 10 generated on the basis of debt to equity ratio anomaly P(10) present high value and Portfolio 1 has lowest value. Portfolio are comprised on the basis of equal weighted and their returns are in percentage form. (P10-P1) denotes the spread of portfolio. CAPM Alphas, FF3 Alphas, FF5 Alphas represent Annualized Estimation Alphas which is calculated by using CAPM, FAMA and FRENCH Three factor model and five factor model. The p-values are reported in parentheses [] indicating significant level at 1%, 5% and 10 % which are represented as *, **, *** respectively and in the end the Wald test is used for analysis, the null hypothesis is that all ten-decile portfolio are jointly equal to zero

Table 09:

Jensen Alphas of Value-Weighted (VW) Portfolios – Debt to Equity

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P10-P1	Wald-Test
CAPM Alpha	2.58	2.71	3.10	-2.26	0.81	-7.71	-1.04	-3.97	-17.78	-16.99	19.57	13.11
	(0.40)	(0.55)	(0.67)	(-0.45)	(0.16)	(-1.14)	(-0.20)	(-0.62)	(-2.62)***	(-1.84)*	(1.95)*	[0.02]
FF3 Alpha	7.17	2.40	2.09	-1.22	2.19	-6.73	-3.63	-3.26	-17.43	-18.00	25.16	9.48
	(0.94)	(0.38)	(0.36)	(-0.19)	(0.34)	(-0.80)	(-0.55)	(-0.42)	(-2.11)***	(-1.61)*	(1.72)*	[0.04]
FF5 Alpha	9.83	3.01	4.11	-2.24	4.86	-8.80	-10.35	-4.67	-20.99	-22.02	34.23	16.10
	(1.25)	(0.46)	(0.68)	(-0.32)	(0.72)	(-1.01)	(-1.57)	(-0.58)	(-2.44)***	(-1.87)*	(1.91)*	[0.01]

Above table represent risk adjustment performance of Decile portfolios create on the grounds of sorting criteria of Value Debt to equity ratio based anomaly for the sample period of 2001 to 2018. All companies are non-financial and listed on Pakistan Stock Exchange (PSX) and they have been sorted in ascending order by annualized month wise returns. Ten Portfolio has been generated on the basis of Debt-to-Equity anomaly P10 has highest value and Portfolio 1 has lowest value. Portfolio are comprised on the basis of Value weighted and their returns are in percentage form. (P10-P1) denotes the spread of portfolio. CAPM Alphas, FF3 Alphas, FF5 alphas Represent Annualized Estimation Alphas which is calculated by using CAPM, FAMA and FRENCH Three factor model and five factor model. The p-values are reported in parentheses [] indicating significant level at 1%, 5% and 10 % which are represented as *, **, *** respectively and in the end the Wald test is used for analysis, the null hypothesis is that all ten-decile portfolio are jointly equal to zero.

CONCLUSION

Efficient market hypothesis suggest that all investors are rational and have complete relevant information about the stocks and they take their action accordingly, because of timely investor action, new information quickly adjust and reflect to the stock prices. By this no of investor can beat in market to earn abnormal returns. But weak form of EMH is technical side is worthless, and strong side have no use. In the world many stocks exchange could not have followed the procedure of EMH. Stock market deviate from these Rules and this Deviation called anomalies. Anomalies could be repeat, occur and disappear and by these anomalies' investor can earn abnormal return and beat the market by using fundamental and technical analysis through the past performance of Stocks market.

Investor most crucial part is pricing the asset appropriately and Invalidity of linearity stock returns in Mean Variance framework have identify many other factors and few of these factors which I have done in my research is Value (Book to market ratio), Dividend Yield and Debt to equity ratio. For achieving my purpose these factor is better predictor for generating abnormal returns, thus Decile portfolios are constructed with 3 anomalies with application of value weighted and equal weighted returns along with Market Value and CAPM. The GMM Model proved that CAPM, FF3 and FF5 models are miss-specified model in Pakistan stock exchange. Empirically t statistics results show that only Value anomaly and debt to equity efficiently price in Pakistan stock and Dividend yield fail to predict abnormal return and can't be considered in PSX. By review result a strong argument is developing and we can say that Value anomaly and debt to equity anomaly are major factors to stocks returns as it captures the variation stocks return compare to other Asset pricing model such as CAPM, FF3 and FF5.

REFERENCES

- Ahmed, M., Mahmood, A. N., & Islam, M. R. (2016). A survey of anomaly detection techniques in financial domain. *Future Generation Computer Systems*, 55, 278-288 <https://doi.org/10.1016/j.future.2015.01.001>
- Al-Horani, A., Pope, P. F., & Stark, A. W. (2003). Research and development activity and expected returns in the United Kingdom. *Review of Finance*, 7(1), 27-46 <https://doi.org/10.1023/a:1022504029943>.
- Allen, F., & Michaely, R. (1995). Dividend policy. *Handbooks in operations research and management science*, 9, 793-837 [https://doi.org/10.1016/s0927-0507\(05\)80069-6](https://doi.org/10.1016/s0927-0507(05)80069-6).
- Arslan, M., Zaman, R., & Phil, M. (2014). Impact of dividend yield and price earnings ratio on stock returns: A study non-financial listed firms of Pakistan. *Research Journal of Finance and Accounting*, 5(19), 68-74 <https://doi.org/10.7176/rjfa/10-22-03>.
- Ball, R. (1978). Anomalies in relationships between securities' yields and yield-surrogates. *Journal of financial economics*, 6(2-3), 103-126 [https://doi.org/10.1016/0304-405x\(78\)90026-0](https://doi.org/10.1016/0304-405x(78)90026-0).
- Banz, R. W. (1981). The relationship between return and market value of common stocks. *Journal of financial economics*, 9(1), 3-18 [https://doi.org/10.1016/0304-405x\(81\)90018-0](https://doi.org/10.1016/0304-405x(81)90018-0).
- Basu, S. (1983). The relationship between earnings' yield, market value and return for NYSE common stocks: Further evidence. *Journal of financial economics*, 12(1), 129-156 [https://doi.org/10.1016/0304-405x\(83\)90031-4](https://doi.org/10.1016/0304-405x(83)90031-4).
- Bhandari, L. C. (1988). Debt/equity ratio and expected common stock returns: Empirical evidence. *The journal of finance*, 43(2), 507-528 <https://doi.org/10.1111/j.1540-6261.1988.tb03952.x>.
- Brennan, M. J. (1970). Investor taxes, market equilibrium and corporate finance (*Doctoral*

- dissertation, Massachusetts Institute of Technology) <https://doi.org/10.1086/ntj41792223>.
- Brigham, E. F., & Houston, J. F. (2021). *Fundamentals of financial management*. Cengage Learning <https://doi.org/10.2307/2327254>.
- Camba Jr, A. C. (2020). Capturing the short-run and long-run causal behavior of Philippine stock market volatility under vector error correction environment. *The Journal of Asian Finance, Economics and Business*, 7(8), 41-49 <https://doi.org/10.13106/jafeb.2020.vol7.no8.041>.
- Campbell, J. Y., Lo, A., & MacKinlay, C. (1997). *The econometrics of financial markets* Princeton University press Princeton. New Jersey: MacKinlay. <https://doi.org/10.1515/9781400830213>.
- Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of finance*, 52(1), 57-82 <https://doi.org/10.1111/j.1540-6261.1997.tb03808.x>.
- Chan, K. C., & Chen, N. F. (1991). Structural and return characteristics of small and large firms. *The Journal of Finance*, 46(4), 1467-1484 <https://doi.org/10.1111/j.1540-6261.1991.tb04626.x>.
- Chordia, T., Goyal, A., Nozawa, Y., Subrahmanyam, A., & Tong, Q. (2017). Are capital market anomalies common to equity and corporate bond markets? An empirical investigation. *Journal of Financial and Quantitative Analysis*, 52(4), 1301-1342 <https://doi.org/10.1017/s0022109017000515>.
- Christie, W. G. (1990). Dividend yield and expected returns: The zero-dividend puzzle. *Journal of Financial Economics*, 28(1-2), 95-125 [https://doi.org/10.1016/0304-405x\(90\)90049-6](https://doi.org/10.1016/0304-405x(90)90049-6).
- Close, L., & Kashef, R. (2020). Combining artificial immune system and clustering analysis: A stock market anomaly detection model. *Journal of Intelligent Learning Systems and Applications*, 12(04), 83 <https://doi.org/10.4236/jilsa.2020.124005>.
- Connor, G., & Sehgal, S. (2001). Tests of the Fama and French Model in India, London School of Economics and Political Science. *LSE Library* https://doi.org/10.1163/_afco_asc_1281.
- De Bondt, W. F., & Thaler, R. H. (1987). Further evidence on investor overreaction and stock market seasonality. *The Journal of finance*, 42(3), 557-581 <https://doi.org/10.1111/j.1540-6261.1987.tb04569.x>.
- Dieci, R., He, X. Z., & Hommes, C. (2014). *Nonlinear economic dynamics and financial modelling*. Springer, Berlin <https://doi.org/10.1007/978-3-319-07470-2>.
- Dimson, E., Nagel, S., & Quigley, G. (2003). Capturing the value premium in the United Kingdom. *Financial Analysts Journal*, 59(6), 35-45 <https://doi.org/10.2469/faj.v59.n6.2573>.
- Escavy, J. I., Herrero, M. J., Trigos, L., & Sanz-Pérez, E. (2020). Demographic vs economic variables in the modelling and forecasting of the demand of aggregates: The case of the Spanish market (1995–2016). *Resources Policy*, 65, 101537 <https://doi.org/10.1016/j.resourpol.2019.101537>.
- Fama, E. F., & French, K. R. (1992). The cross-section of expected stock returns. *the Journal of Finance*, 47(2), 427-465 <https://doi.org/10.1111/j.1540-6261.1992.tb04398.x>.
- Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, 33(1), 3-56 [https://doi.org/10.1016/0304-405x\(93\)90023-5](https://doi.org/10.1016/0304-405x(93)90023-5).
- Fama, E. F., & French, K. R. (1995). Size and book-to-market factors in earnings and returns. *The journal of finance*, 50(1), 131-155 <https://doi.org/10.1111/j.1540-6261.1995.tb05169.x>.
- Fama, E. F., & French, K. R. (2006). Profitability, investment and average returns. *Journal of financial economics*, 82(3), 491-518 <https://doi.org/10.1016/j.jfineco.2005.09.009>.
- Fama, E. F., & French, K. R. (2008). Dissecting anomalies. *The Journal of Finance*, 63(4),

- 1653-1678 <https://doi.org/10.1111/j.1540-6261.2008.01371.x>.
- Fama, E. F., & French, K. R. (2015). A five-factor asset pricing model. *Journal of financial economics*, 116(1), 1-22 <https://doi.org/10.1016/j.jfineco.2014.10.010>.
- Fama, E. F., & MacBeth, J. D. (1973). Risk, return, and equilibrium: Empirical tests. *Journal of political economy*, 81(3), 607-636 <https://doi.org/10.1086/260061>.
- Fletcher, J. (2001). An examination of alternative factor models in UK stock returns. *Review of Quantitative Finance and Accounting*, 16(2), 117-130 <https://doi.org/10.1023/a:1011270907471>.
- Frazzini, A., & Pedersen, L. H. (2014). Betting against beta. *Journal of Financial Economics*, 111(1), 1-25 <https://doi.org/10.1016/j.jfineco.2013.10.005>.
- Gao, X. S., & Wang, Y. (2021). Mining the Short Side: Institutional Investors and Stock Market Anomalies. *Journal of Financial and Quantitative Analysis, Forthcoming* <https://doi.org/10.1016/j.irfa.2020.101648>.
- Graham, B., & Dodd, D. (1940). *Security Analysis: Principles and Technique* (Columbus).
- Green, J., Hand, J. R., & Zhang, X. F. (2017). The characteristics that provide independent information about average us monthly stock returns. *The Review of Financial Studies*, 30(12), 4389-4436 <https://doi.org/10.1093/rfs/hhx019>.
- Gregory, A., Harris, R. D., & Michou, M. (2001). An analysis of contrarian investment strategies in the UK. *Journal of Business Finance & Accounting*, 28(9-10), 1192-1228 <https://doi.org/10.1111/1468-5957.00412>.
- Hakim, S. A., Hamid, Z., Meera, M., & Kameel, A. (2016). Capital Asset Pricing Model and pricing of Islamic financial instruments. *Journal of King Abdulaziz University: Islamic Economics*, 29(1) <https://doi.org/10.4197/islec.29-1.2>.
- Hamada, R. S. (1969). Portfolio analysis, market equilibrium and corporation finance. *The Journal of Finance*, 24(1), 13-31.
- Harvey, C. R., Liu, Y., & Zhu, H. (2016). ... and the cross-section of expected returns. *The Review of Financial Studies*, 29(1), 5-68 <https://doi.org/10.1093/rfs/hhv059>.
- Hens, T., & Naebi, F. (2021). Behavioral heterogeneity in the capital asset pricing model with an application to the low-beta anomaly. *Applied Economics Letters*, 28(6), 501-507 <https://doi.org/10.1080/13504851.2020.1761529>.
- Hou, K., Xue, C., & Zhang, L. (2015). Digesting anomalies: An investment approach. *The Review of Financial Studies*, 28(3), 650-705.
- Jebran, K., & Chen, S. (2017). Examining anomalies in Islamic equity market of Pakistan. *Journal of Sustainable Finance & Investment*, 7(3), 275-289.
- Jensen, M. C. (1978). Some anomalous evidence regarding market efficiency. *Journal of financial economics*, 6(2/3), 95-101.
- Kostakis, A., Kashif, M., & Siganos, A. (2011). Higher Co-Moments and Asset Pricing on London Stock Exchange. *Journal of Banking & Finance*.
- Kostakis, A., Muhammad, K., & Siganos, A. (2012). Higher co-moments and asset pricing on London Stock Exchange. *Journal of Banking & Finance*, 36(3), 913-922 <https://doi.org/10.1016/j.jbankfin.2011.10.002>.
- Li, Z., Li, Q., & Zeng, Y. (2020). Contraction flexibility, operating leverage, and financial leverage. *Journal of Management Science and Engineering*, 5(1), 43-56 <https://doi.org/10.2307/1924119>.
- Lintner, J. (1965). The Valuation of Risk Assets and The Selection of Risk Investments <https://doi.org/10.2307/1924119>.
- Lintner, J. February 1965, The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *Review of Economics and Statistics*, 47 <https://doi.org/10.2307/1924119>.

- Liyanapathirana, B. J., & Ranasinghe, R. P. K. C. M. (2020). Stock Market Measures and Market Performance. *Journal of Economic Science Research* | Volume, 3(02) <https://doi.org/10.30564/jesr.v3i2.1672>.
- Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383-417.
- Marisetty, N. (2020). Dividend Signaling Hypothesis, Semi-strong form of Hypothesis and Market Capitalization Anomaly in Indian Stock Market. *Pensee International Journal*, 50, 12 <https://doi.org/10.2139/ssrn.3773372>.
- Markowitz, H. (1952). Portfolio selection. *The Journal of Finance*, 7(1), 77-91 <https://doi.org/10.1111/j.1540-6261.1952.tb01525.x>.
- Markowitz, H., Guerard, J., Xu, G., & Beheshti, B. (2021). Financial Anomalies in Portfolio Construction and Management. *The Journal of Portfolio Management*, 47(6), 51-64 <https://doi.org/10.3905/jpm.2021.1.242>.
- Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American*, 1, 3.
- Mossin, J. (1966). Equilibrium in a capital asset market. *Econometrica: Journal of the econometric society*, 768-783 <https://doi.org/10.2307/1910098>.
- Muns, S. (2019). The size anomaly in European financial stock returns. *International Finance*, 22(2), 155-170 <https://doi.org/10.1111/inf.12330>.
- Nakano, M., Takahashi, A., & Takahashi, S. (2017). Fuzzy logic-based portfolio selection with particle filtering and anomaly detection. *Knowledge-Based Systems*, 131, 113-124 <https://doi.org/10.1016/j.knsys.2017.06.006>.
- Nartea, G., Gan, C., & Wu, J. G. (2008). Persistence of Size and Value Premia and the Robustness of the Fama-French Three Factor Model in the Hong Kong Stock Market. *Investment Management and Financial Innovations*, 5, 39-49.
- Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics*, 108(1), 1-28 <https://doi.org/10.1016/j.jfineco.2013.01.003>.
- Nurwulandari, A. (2021). Analysis Of The Relationship Between Risk And Return Using The Capital Asset Pricing Model (Capm) Method At Kompas 100. *Enrichment: Journal of Management*, 11(2), 528-534 <https://www.enrichment.iocspublisher.org/index.php/enrichment/article/view/137>.
- Pandey, A., & Joshi, R. (2021). Examining Asset Pricing Anomalies: Evidence from Europe. *Business Perspectives and Research* <https://doi.org/10.1177/22785337211025712>.
- Racicot, F. E., & Rentz, W. F. (2016). Testing Fama–French’s new five-factor asset pricing model: evidence from robust instruments. *Applied Economics Letters*, 23(6), 444-448.
- Rakhiani, S. (2021). An empirical examination of beta anomaly in India. *DECISION*, 1-16 <https://doi.org/10.1007/s40622-021-00278-6>.
- Rojo-Suárez, J., Alonso-Conde, A. B., & Ferrero-Pozo, R. (2020). Liquidity, time-varying betas and anomalies: Is the high trading activity enhancing the validity of the CAPM in the UK equity market? *International Journal of Finance & Economics* <https://doi.org/10.1002/ijfe.2136>.
- Rosenberg, B., Reid, K., & Lanstein, R. (1985). Persuasive evidence of market inefficiency. *The Journal of Portfolio Management*, 11(3), 9-16 <https://doi.org/10.3905/jpm.1985.409007>.
- Rossi, M., & Fattoruso, G. (2017). The EMH and the market anomalies: an empirical analysis on Italian stock market. *International Journal of Managerial and Financial Accounting*, 9(3), 222-241 <https://doi.org/10.1504/ijmfa.2017.086689>.
- Rossi, M., & Gunardi, A. (2018). Efficient market hypothesis and stock market anomalies: Empirical evidence in four European countries. *Journal of Applied Business Research*

- (*JABR*), 34(1), 183-192 <https://doi.org/10.19030/jabr.v34i1.10111>.
- Shaikh, A. J., & Kashif, M. (2017). Asset Growth Anomaly and Stock Returns: An Evidence of Karachi Stock Exchange (KSE) Market. *Journal of Independent* <https://doi.org/10.31384/jisrmsse/2017.15.2.10>.
- Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, 19(3), 425-442 <https://doi.org/10.1111/j.1540-6261.1964.tb02865.x>.
- Singh, J. E., Babshetti, V., & Shivaprasad, H. N. (2021). Efficient Market Hypothesis to Behavioral Finance: A Review of Rationality to Irrationality. *Materials Today: Proceedings* <https://doi.org/10.1016/j.matpr.2021.03.318>.
- Singh, S., & Yadav, S. S. (2015). Indian stock market and the asset pricing models. *Procedia Economics and Finance*, 30, 294-304 [https://doi.org/10.1016/s2212-5671\(15\)01297-6](https://doi.org/10.1016/s2212-5671(15)01297-6).
- Timmer, Y. (2018). Cyclical investment behavior across financial institutions. *Journal of Financial Economics*, 129(2), 268-286 <https://doi.org/10.1016/j.jfineco.2018.04.012>.
- Titman, S., Wei, K. J., & Xie, F. (2013). Market development and the asset growth effect: International evidence. *Journal of Financial and Quantitative Analysis*, 48(5), 1405-1432 <https://doi.org/10.1017/s0022109013000495>.
- Treynor, J. L. (1961). *Toward a theory of market value of risky assets* <https://doi.org/10.1002/9781119196679.ch6>.
- Vassalou, M., & Xing, Y. (2004). Default risk in equity returns. *The journal of finance*, 59(2), 831-868 <https://doi.org/10.1111/j.1540-6261.2004.00650.x>.
- Vincent, K., Hsu, Y. C., & Lin, H. W. (2020). Investment styles and the multiple testing of cross-sectional stock return predictability. *Journal of Financial Markets*, 100598 <https://doi.org/10.1016/j.finmar.2020.100598>.
- Wandera, R. O. (2014). *Change management in financial institutions: A case study of Kenyan banks* (Doctoral dissertation, United States International University-Africa) <http://erepo.usiu.ac.ke/11732/168>.

