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KASBIT Business Journal, 13(1), 11-24, September 2020

Understanding Accrual Anomaly: Evidence from Pakistan Equity Market

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Abstract

Several recent research papers provide evidence that there exists an accrual anomaly in the stock exchanges all over the world. For this study, the trends along the Pakistan Stock Exchange (PSX) have been reviewed, investigated, and narrated. This study investigates several portfolios of investments in the Pakistan Stock Exchange, to analyze the concept of accruals anomaly. Furthermore, this study explains in detail the relationship between the present investments and the future cash flows and briefs investors about the marketing conditions and the reasons for massive fluctuations in the stock prices due to accruals and future cash flows. The main objective of the study is to examine the fact that the future earnings and stock returns of the investors depend upon the level of accruals of the firms in which they are investing. In normal circumstances, higher investments will yield higher returns but in practical scenarios, the nature of investments in the firms is dependent upon the nature of accruals in that firm. If an investor invests in the stocks of the firm that has a higher market value but it also has a high level of accruals, then the expected return on these stocks will be lesser (negative). Moreover, the market risk of these investments will be greater. On the contrary, the investment in firms that have a low level of accruals yields a high return on their stocks. And these firms relatively have a lower risk of the investment. The core purpose of this study is to investigate the effects of the accruals on returns, by taking in the real data gathered from the PSX. In addition to the descriptive analysis of these facts, this research also lays stress on different strategies that can be undertaken by the investors to hedge the risk of these anomalies. The study concluded that the firms with lower accrued asset base provide better stock returns as compared to firms with higher accrued asset growth. The study found a presence of accrued asset growth anomaly in the Pakistan Stock Exchange.

Keywords*:* Accrual, Anomalies, asset pricing, Pakistan stock exchange, portfolio

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JEL Classification: G1, G11, G12

Introduction

Accrual anomaly relates to the stock returns that the investors get on their investments in the stock market. The future returns on stock are also measured as anomalies. These anomalies cannot be reorganized through the CAPM model (Sharpe, 1964). Former researches indicate that the stocks having a high fundamental to price ratio perform better than those having a low fundamental to price ratio. This behavior of stocks is known as the Glamour Stocks (Graham & Dodd, 1934). Besides, the fundamental to price ratio is referred to as the Price-to-Book ratio that calculates either stock prices are overvalued or undervalued. This is done by relating the net assets of the company to the prices of all shares that are rendered outstanding. Hence, the fundamental to price ratio is also taken as a great indicator that investors are eager to pay for each unit of an entity's asset.

As important as it is to identify these problems and finding solutions to them, earning management also plays an important role in smoothing the volatility of business incomes. It helps in reducing the risks associated with investments in stock markets. Management of the company intentionally manages to earn a management strategy for the profits of the company. For this, the strategy is undertaken so that the earning figures match the pre-determined targets. Therefore, earning management applies to only managers under the accrual-based system (Abel & Mishkin, 1983). Technically, the two basic financial systems are termed as cash-based and accrual-based accounting systems (Ali et al., 2008). In a cash-based accounting system, the transactions are recorded only when a firm receives or pays cash, however, in the accrual-based accounting system all the financial transactions are documented when they arise (Bradshaw, Richardson & Sloan, 2001). In the accrual-based financial system, the accruals are considered as balance sheet accounts mentioning liabilities and non-cash-based assets. More importantly, they consist of accounts like account payable, account receivable, future tax liability, future tax expense, and goodwill. Also, the accrual-based system has increased the amount of information for reporting purposes. Previously, only cash-based transactions were recorded and reported which encompassed only a limited amount of information. Hence, earning management is possible only when a firm has adopted the accrual-based system. Former researches (see Teoh et al., 1998; Sloan, 1996) describes the technique to recognize the process of managing incomes by using accruals. Accruals on the investments are estimated for the future period. Therefore, any error in estimating the incomes and fundamentals might prove an insignificant amount of loss.

In real, the accruals shall be reversed when their predicted economic benefits are acknowledged, and their reversal might not affect any future year earnings. Similarly, no difference will arise between actual and forecasted earnings. However, in reality, accruals when reversed, affect both the prospective and current earnings. This notion is termed as the "Accrual Anomaly". First, this concept was presented by (Sloan, 1996). It describes a reverse association for accrual & future return of shares. Such anomalies have been heavily researched by various investors and market analyzers (Callen & Segal, 2004). The difference between the actual and forecasted benefits is due to some errors in the accrual estimations (Abel & Mishkin, 1983). And these errors have an overall effect on the market-based earning i.e. the future stock returns. Therefore, to avoid approximation errors and to yield results, this study calculates the accruals by employing the cash flow approach. Likewise, using the cash flow technique, the study also shows the impact of the accruals on future

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earnings. Many studies show that accruals are associated with economic features and these features assume the return on future cash flows. The study suggests that investors should opt for portfolios with lower accrued assets because it will reduce possible future losses. The study suggests that investors should avoid a portfolio of high accrued assets because it can be fatal.

Literature Review

Many studies reveal that accruals are closely linked with economic features and these features predict the return on future year cash flows. Dechow and Dichev (2002) identified the nature of accruals and future incomes by using innovative techniques for the approximation of the accruals. The calculation of accruals shows a similarity of current accruals to the past, present, and future cash flows. According to Hribar and Collins (2002), the influence of measuring accruals errors. Their calculations show that the value of accruals based on the balance sheet approach which shows substantial errors when compared to the calculation of the accrual through the cash flow method. In the balance sheet accruals are estimated by the change in actual cash in hand and other cash equivalents, the change in yearly depreciation expenses and amortization expenses, and certain changes in current liabilities, in a precise period. The estimation errors from the balance sheet approach conclude that it's much beneficial to calculate the cash flow statement directly (Hribar & Collins, 2002). It would aid in avoiding estimation errors. The cash flow approach minimizes the risk of estimation errors, but it fails to recognize the consequence of a high level of accruals, for example, in case of bad debts for a firm. Increased bad debts adversely affect the earning of a firm. Although fair results are obtained through the cash flows, manipulation in the earnings is the problem for the stockholders because they fail to estimate the expected earnings on such accruals.

Accruals and Future Stock Returns

Sloan (1996) concluded, the negative relationship between the accruals of the entity and the future incomes on the stock. He reveals that if a firm possesses high accruals has a negative relation between the stock return and accruals and the entity that has a low amount of accrual has a positive impact on the stock returns. LaFond (2005) inferred a hesitant answer about global accrual anomaly. Further verification of either the underlying basis common for all or not, he finds that it is very different between the markets because of the managerial discretion, analyst following, and ownership structure of the management. Furthermore, the result indicates that the deviation of accruals is not due to exact accrual approximation methods, but it relates that how a firm practically follows the accrual system. On the other hand, Core, Guay & Rusticus (2006) reviewed the concepts of a bad score of accruals in the market and the accrual components and explore the hypothesis of the profit fixation, a casual summary of accrual anomaly. After the elimination of 1 percent of data, however, show that the investigation principle fails, the method itself is doubtful if it is right to eliminate outliers.

Richardson et al. (2010) concluded that accruals having low consistency are connected with low-income persistence and stockholders under or overvalued the stocks. They also report that the liability accruals show detailed information about future stock returns. Moreover, the investigations also conclude that financing and investing accruals give extra information for estimating the earning persistence and future stock returns. Also, Livnat et al. (2006) explored the existence of the accrual anomaly quarterly basis. They are of the view that just like the annual accruals the quarterly accruals also affect the future expected returns in the same manner. They reveal that the quarterly accruals are closely linked with the current net operating cash flows, but they have an impact on the quarterly accruals too. Hirshleifer et al. (2009) explored the relationship among the accruals of an entity and the cash flow it earns and has linked it with the returns in the stock market. The study examined the accumulated cash flows and the accumulated accruals and their influence on the

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aggregate return by stock in the future. The aggregate accruals affect the future aggregate cash flow negatively. It displays that the accrued accruals are fewer persistent than the upcoming future accrued cash flows. Accordingly, Sehgal et al. (2012) researched the part of the accrual principles to gain resistance and examine whether Indian investors properly value the information in the appreciation of the market stock price.

Financial analysts have a leading role as intermediaries in stock market information (Schipper, 1991). As a result, the analyst's capability to integrate value information in its available expectations may affect stock prices. The theory also adopts that investors are affected by analysts' expectations of profit, which is largely braced by previous studies. A suggestion that analysts' estimations affect the prices of securities has accumulated over the past three decades (see Givoly and Lakonishok 1979; Stickel 1991). Different analyses have shown that revenue forecasts contain publicly available data that is valuable for forecasting future incomes. For example, Stober (1992) determined the capability of experts to forecast performance predictions incorporating predictive information presented in the summary by Ou and Penman (1989) extracted from past financial reports, and Abarbanell and Bushee (1997) assessed the relationship between expert's predictions and evaluate relevant essential variables recognized by Lev and Thiagarajan (1993). These studies show that analysts do not understand information about profits/earnings included in past accounting information and provide their suggestion that this aspect of their comportment may contribute to the poor market assessment.

However, in some areas, poor market pricing seems to reflect a bias greater than expected in the forecast results of marginal investor's marginal investors. Bernard and Thomas (1990) reported, for example, that prices of stock do not fully reflect the effects of quarterly earnings of the current period on future revenues. Then Abarbanell and Bernard (1992) examined security analysts who reacted negatively to past income data could clarify these abnormal returns. It is revealed that analysts' predictions only reacted approximately half of what was important to clarify the delayed adjustments of prices of stock. Frankel and Lee (1998) made up a profitable commercial rule that is based upon the relationship between the "intrinsic value" of the stocks and their market value. The measures of the intrinsic value of the stocks are based on the forecast growth and earnings of the financial analyst, which implies that investors do not effectively integrate the expectations of this analyst in the prices of securities. Elgers et al. (2001) reported the same. They explained that deferred adjustments of the stock price to the analysts' forecasts on the results of the actions. Taken together, these studies suggest that financial analysts suffer less than investors because of the inefficiency of information. The accruals have an integral effect on the profits of the company. The estimation of financial experts also affects the value of the accruals. The price of the accruals has an impact on the cash flow of the business. The decreased cash flows have a direct impact on the profit of the entity. Different studies have suggested different methods to cope with the ever-changing prices of accruals.

Bernard and Thomas (1990) reported that the reactions of market to future year cash flow declarations are foreseeably created based on current cash flows information, which is reliable with investors retaining a childlike cash flow expectations model. In this situation, higher stock prices in the stock markets impact the cash flows that are relative to accruals that are shown in many previous studies. It is suggested that when the extent of change is seized persistent, under the reaction of investors to cash flow modifications will lead to higher future earnings than under-reaction to accruals modifications.

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Firm Characteristics and dependence of Accruals on Beta Equity & Systematic Risks

Researches have shown that there is anomalous behavior between various aspects of the firm. These comprise the firm size & accruals etc. Studies showed that the firm's beta plays an important role in managing accruals. Mis-measuring or mispricing the betas or risks leads to some anomalies. If betas are dependent upon the firm's features, then it becomes problematic to assess competing clarifications without openly demonstrating the requirement of betas on the firm's characteristics (Freson & Harvey, 1998). Various later hypothetical papers mentioned systematic risk as a component of business qualities, for example, book-to-market financial ratio and another variable Size. Furthermore, the core of the studies directed by them is that the beta of the firm is highly dynamic and changes with the firm qualities that convey opportune molding data about an ongoing risk change. More accurately, the firm abilities are an adequate insight for some factors identified with the changes in risk (Callen & Segal, 2004.). (Berk-et-al, 1999.) created an energetic way out where the systematic risk of firm shifts typically because of ideal investment choices that alter both simultaneously. The danger of introduced investment and the extent of introduced investment concerning development alternatives. The book-to-market financial ratio and Size are some major variables that summarize the risk related to the introduced capital importance. The model explains that the size of the firm and the book-to-market ratio of the frim is a risk-based evaluation that causes the anomaly in the accrual-based accounting system of the firm. The suggestion is that irregular patterns in the information can be clarified by risk.

The investigations of Gomes et al. (2003) and Berk et. Al. (1999) derived the conditional based betas which respond as a purpose of the book-to-market ratio of the firm and also the size of the firm. These betas are developed based on economic intuition. The betas are calculated considering the market stimulations and market anomalies so that the effect on the accruals can be minimized. But more often firms tend to unobserved or measure such uncertainties that lead to errors. Similarly, Study conducted by Carlson et. al. (2004) also showed that the firm's beta or systematic risk calculations play a key role in investment decisions and defining incomes on the accruals invested in the markets. The firm size captures the growth of the entity, while the book-to-market financial ratio captures the leverage effects. The growth of the firm is relative to the introduced capital, and risks relating to it while the book to market ratio is relative to the operating leverage of the business. Risks related to both parameters are taken into account and betas are calculated which serve as the base for estimating the return on the accruals. This process is referred to as the conditional CAPM model.

Earning Fixation Hypothesis

This hypothesis examines whether a person's status as a prospective or a current stockholder affects the stockholder's vulnerability to earnings fixation or not. It suggests that current stakeholders are more vulnerable to earnings to fixation than potential stakeholders. The current investors can forecast future earnings as a part of their evaluation process and reduce the earnings fixation. The earning fixation hypothesis explains the accrual anomaly that the investors often fixate upon the earning pattern of their investments. They fail to comprehend separately to the accrual anomaly and cash-flow element of incomes. The idea of pessimistic and optimistic investors originates from the accrual anomaly effect. The investors fixate on the earing pattern of their investments. The investors who have invested in higher stock values, often estimate their earnings to be higher.

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Developing Hedge Strategy & Determining Market Conditions and Business Cycle for Accrual Anomaly

Sloan (1996) concluded that a hedging strategy can be undertaken by the entities to avoid the accrual anomaly. The company might purchase certain low-priced stocks and offer high accruals stocks, this way the entity can earn huge returns for the subsequent year. The up and down stock market also plays an essential role in estimating the accruals of the company. The financial experts integrate the marketing conditions while determining their returns on the accruals. The marketing conditions should always be integrated while estimating the future cash flows of the entity. Generally, there are two types of marketing conditions. The Up-market and the Down-market. The up-market usually comprises of stocks that have a higher return. The market is full of optimistic investors who have invested in stocks at higher prices. Whereas, the down-market the investors are quite pessimistic about their investments and the return thereupon. Because they have invested in companies that are undervalued in the stock market. Based on the valuation techniques, the accruals are often predicted. One of the main things that play a key role in the firm's valuation is risk beta. Through the CAPM model, betas can be understood much easily. The betas take in the marketing risk of the company and help in determining the optimal discount rate at which the companies shall discount their future cash flows. The companies operating at high risk often have higher betas and consequently higher discount rates. The companies that don't take many risks often have less risky beta factors and hence have relatively lower discount rates.

Accrual Anomaly concerning Pakistan Stock Market

According to the authors' horizon, sole research that highlights accrual anomaly issues for the Pakistani market is conducted by Mohammad and Javid (2015). They concluded the presence of accrual anomaly in the Karachi Stock Exchange (KSE) by examining the accrual behavior of listed non-financial firms. The investigation explores the accrual components and the existence of the cash flows and their influence on the upcoming future stock prices and numerous hedge portfolios. They have adopted the balance sheet approach to estimate the earnings. The results of their findings show that the persistence in earnings of the non-financial firms depends on the components of the firm's Size and incomes that are the forthcoming cash flows and accruals. The core of the study also displays a negative connection between the accruals and cash flows. Moreover, one key fact about the investigation is that it employs the balance sheet approach, which comprises high chances of estimation error as compared to the other approach i.e. cash flow approach. Moreover, Mohammad and Javid (2015) also failed to define the main role of accrual reversals when defining the accrual anomalies. Not only this, several other investigations undertook the approach of using a balance sheet to specify the accrual anomaly that has larger probabilities of estimation errors. Therefore, this study explores the accrual anomaly by using the approach of cash flow that shows low estimation errors.

Research Methodology

Data

In this study, individual stocks data of all delisted and listed non-financial firms is collected from 2000 to 2017 from the database of Thomson Reuters DataStream and Pakistan Stock Exchange (PSX), to compute monthly discrete returns of the equity market and individual stocks. The reason for the insertion of all listed firms and delisted firms for the studied period is to avoid survivorship bias (See: Nagel, 2001). Furthermore, this study pays particular attention to the reasons for using data of delisted firms. Similarly, this study follows Dimson et al, (2003), and Soares and Stark's (2009) notion who used the idea of rectifying Shumway's (1997) delisting bias by setting return on the stock in the month of delisting equal to -100%. Importantly, this study only analyzes non-financial firms and excluded financial firms from the model as their capital structure

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maintaining practices are different that affect the overall findings. Moreover, this study calculates the monthly market value by considering time i.e. *(t-1)* and monthly basis return on time *(t)*. The financial ratio of the asset growth ratio is taken as the annual frequency at a time *(t-1)*.

Variables Calculation

Returns on investments are better when constructed a portfolio rather than investment returns of the individual stock. The rationale behind this is that individual stock carries specific company-specific risk, which causes hurdles in creating an anticipated pattern of returns (Campbell & MacKinlay, 1997). Such specific risk can simply be minimized by constructing a portfolio and diversifying risk (Markowitz, 1952). Due to diversification in the portfolio, their beta is relatively low as compared to the stock of an individual company (Black, Jensen & Scholes, 1972). This research study has constructed portfolios of different companies listed on the Pakistan Stock Exchange on a monthly approach to calculate asset growth ratio, discrete return, and market value. Discrete returns can be defined as the value of individual stock weighted to its proportion of investment in the portfolio (Campbell & MacKinlay, 1997). Hence, this study uses discrete returns of 655 listed and delisted non-financial firms of the Pakistan Stock Exchange (PSX). Discrete return is expressed in equation form, where, portfolio return *(p)* at a specific time *(t)* is being considered and calculated, as below:

$$R_{pt} = \sum W_{ip}.R_i\,, \qquad Where\ i = 1,2,3,4, \ldots N$$

Data for market value along with the mnemonic code (WC02999) of market value is collected from Thomson Reuters DataStream. The asset growth ratio is calculated using data from the PSX data portal. Cooper, Gulen, and Schill (2009) defined asset growth ratio as a variation in the total assets of the organization per year in terms of percentage. They defined asset growth anomaly, as organizations having a smaller asset base give better stock returns to organizations having a bigger asset base. The formula to calculate the asset rate given by them is as below:

$$Asset\ Growth\ Rate = \frac{TotalAssets_t - TotalAssets_{t-1}}{TotalAssets_{t-1}}$$

Here, the growth rate of assets indicates the changes in total assets at the selected period *(t)* which is divided by values of total assets on the selected period i.e. *(t – 1)*. Furthermore, the above equation specifies the growth of assets or resources that is assessed by using the equation mentioned below:

$$\begin{aligned} &Total\ Asset\ Growth\ (left\ hand\ side) \\ &\quad = Cash\ \Delta Growth\ (\Delta Cash) \\ &\quad + NonCash\ Current\ Assets\ Growth\ (\Delta Current\ Assets) \\ &\quad + Long\ Term\ Assets\ Growth\ (\Delta Long\ Term\ Assets) \\ &\quad + Other\ Asset\ Growth\ (\Delta Other\ Asset) \end{aligned}$$

Besides, the similar asset growth from different equities and financial sources side is estimated as:

$$\begin{aligned} &Total\ Asset\ Growth\ (right\ hand\ side) \\ &\quad = Operating\ Liabilities\ Growth\ (\Delta Operating\ Liabilities) \\ &\quad + Retained\ Earnings\ Growth\ (\Delta Retained\ Earnings) \\ &\quad + Debt\ Financing\ Growth\ (\Delta Debts) + Equity\ Financing\ (\Delta Equity) \end{aligned}$$

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After the estimation of the asset growth rate, the equities have been ranked based on asset growth rates and all those firms that have absent/missing values have been omitted from this study data set.

Sorting Criteria & Portfolio Construction

This study uses a single sorting method. Hence, at the end of each particular month *(t)*, the value of stocks is taken distinctly as per the asset growth ratio (sorting criteria) in that month into decile portfolios. Besides, the collected data is prearranged in ten dissimilar portfolios that start from the low-level asset growth ratio to the high-level asset growth ratio and named start from P1 to P10. Additionally, portfolio 1 which is mentioned as P1, is comprised of stocks that have low values of asset growth ratio, while portfolio 10 or P10 consists of stocks that contain high asset growth values. Likewise, the return of portfolios or post ranking returns is calculated by using monthly data. Therefore, 6 months T-bills are calculated by using both equal portfolio and value-weighted portfolio over the risk-free rate. Afterward, the profitability of the asset growth portfolios is estimated by three different asset pricing models i.e. FAMA three-factor, FAMA five-factor, and CAPM.

Statistical Analysis

Descriptive Statistics

For this study, the data has been extracted from the data portal of PSX and Thomson Reuters Datastream. The monthly basis of 17 years of data is extracted from January 2000 to December 2017. The data is used to create decile portfolios. A decile portfolio consists of 10 different portfolios. These decile portfolios are mentioned from P1 to P10. Decile portfolios constructed in this research are in ascending order of asset growth in the companies which means that P1 consists of companies that have the lowest asset growth, P2 consists of companies that have greater asset growth as companies in P1 and likewise for all other portfolios. Whereas, P10 consists of firms that have the highest asset growth. In this research study, portfolios' returns are estimated by two methods which are the equally-weighted method and the value-weighted method. Returns are extracted every month for all 18 years. These monthly returns of one year were averaged to get annualized returns of the year for the entire study period. In this study, the results of VW and EW for the performance of the risk-adjusted portfolio are tested on three indicated models i.e three-factor of Fama-French then five-factor of Fama-French, and lastly, CAPM of time-series data are also explained.

Table 1: Descriptive Statistics of Asset Growth in Decile Portfolios

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	T Values
EW	0.42	0.31	0.29	0.27	0.28	0.17	0.34	0.25	0.19	0.16	0.26	3.35***
VW	0.35	0.25	0.23	0.27	0.19	0.16	0.31	0.22	0.10	0.27	0.08	2.32**
MV Rs. (000)	60.12	145.64	117.86	163.95	225.03	192.75	199.24	121.80	146.27	121.06	-60.94	6.66***
CAPM Beta	0.86	0.83	0.92	0.97	0.85	0.90	1.07	0.80	1.03	1.00	-0.14	3.71

The above table presents the characteristics of decile portfolios based on asset growth from January 2001 to December 2017. All stocks listed in PSX are arranged in ascending order at month (t) according to the asset growth values and are assigned to ten different portfolios

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(P1 to P10). The decile portfolio P1 depicts the stocks with the lowest estimated asset growth and the decile portfolio P10 contains stocks with the highest estimated asset growth. At month (t + 1), the excess returns of decile portfolios are estimated to present post ranking returns and all portfolios are rebalanced monthly. P1-P10 is the spread between the lowest asset growth portfolio (P1) and the highest asset growth portfolio (P10). EW excess returns (% p.a) and VW excess returns (% p.a) represent annualized average monthly returns of equally weighted and value-weighted portfolios respectively. MV (Rs. In thousands) shows the average market value of stocks included in each portfolio and CAPM β is a full sample beta estimate of the value-weighted portfolio's returns. T-test value (statistical significance at different levels * at 10%, ** at 5%, and *** at 1%) represents the results of a Wald test referring to the null hypothesis that there is no difference in means between the characteristics of P1 and P10.

The table above shows descriptive statistics of asset growth in decile portfolios from 2000 to 2017. The table shows that there are 10 portfolios arranged in 10 columns and for each portfolio, EW (equally weighted returns), VW (value-weighted returns), market value, and CAPM beta are estimated. The last two columns represent the result of P1-P10 and T-values of the EW, VW, MV, and CAPM beta. The data is categorized into 10 portfolios in ascending order, namely P1 to P10. P1 portfolio is a representation of those companies, which have the smallest asset growth in them; similarly, the P2 portfolio is a representation of those companies, which have greater asset growth in them in comparison to P1 companies. Lastly, the P10 portfolio is a representation of those companies, which have the biggest asset growth in them in comparison to companies in all other portfolios. Results show that the EW return of P1 is 0.42, EW return of P10 is 0.16, and the P1-P10 result is negative 0.26. This means that the EW return of P1 is greater than the EW return of P10. Similarly, the VW return of P1 is 0.35, VW return of P10 is 0.27 and the P1-P10 result is 0.08. This means that the VW return of P1 is greater than the VW return of P10. Both EW and VW returns' results show that companies with lower asset growth give higher returns and companies with higher asset sizes give lower returns. This validates the presence of asset growth anomaly in PSX, as per the outcomes mentioned in descriptive results for asset growth in the decile portfolio.

Risk-Adjusted Performance of Stock Returns

This section explains Fama French's alphas and Jensen's alpha which are estimated to adjust the risk related performance of EV that is the abbreviation of equally-weighted portfolios and VW that is the abbreviation of value-weighted portfolios and named from portfolio one i.e. P1 to portfolio 10 i.e. P10. The below-mentioned formula is employed to estimate Jensen's alpha:

$$R_{i,t} - R_t^f = \alpha_i + \beta_{i,MKT}(R_{m,t} - R_t^f) + \varepsilon_{i,t}$$

Here, Ri,t indicates the portfolio return (i) in a nominated month (t), Likewise, R_t^f indicates the monthly risk-free rate (t) and $(R_{m,t} - R_t^f)$ shows the excess return in the selected portfolio in a nominated month (t). Similarly, for evaluation of an alpha model of Fama French and the model presented by Fama French (1993) that is three-factor models and another Fama French (2015) model that is taken as a model which is five-factor are employed separately:

$$R_{i,t} - R_t^f = \alpha_i + \beta_{i,MKT}(R_{m,t} - R_t^f) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \varepsilon_{i,t}$$

$$R_{i,t} - R_t^f = \alpha_i + \beta_{i,MKT}(R_{m,t} - R_t^f) + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + \beta_{i,RMW}RMW_t + \beta_{i,CMA}CMA_t + \varepsilon_{i,t}$$

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Here, SMB_t is taken as a monthly risk factor *(t)*, *HTML* is considered as a monthly factor that is value risk *(t)*, RMW_t is the risk factor for operational income or profitability in a nominated month *(t)* and CMA_t is a risk factor for the investment in a nominated month *(t)*. Moreover, the systems of equations that are mentioned above are used to test the alpha of the combined significance of decile portfolios. Therefore, if values of alphas are evaluated by using an estimator of generalized methods of moments (GMM), then the systems of equations help in mitigation of the problems of measurement error in variables, heteroscedasticity, and serial correlation.

Equally Weighted (EW) Returns

Table 2: Equally Weighted (EW) Asset Growth Portfolios' Jensen Alpha

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	WALD-TEST
CAPM Alpha	0.20 (1.92)*	0.11 (2.28)**	0.08 (1.70)*	0.06 (2.18)**	0.09 (-2.39)**	-0.02 (1.90)*	0.07 (1.17)	0.04 (2.42)**	0.01 (1.86)*	-0.09 (3.15)***	0.29 (3.28)***	22.70 (0.01)
FF3 Alpha	0.19 (1.97)**	0.07 (2.26)**	0.06 (1.37)	0.05 (2.52)**	0.07 (-1.04)	-0.02 (1.91)*	0.04 (1.76)*	0.02 (1.87)*	-0.01 (1.93)*	-0.09 (2.45)**	0.28 (2.60)***	10.80 (0.03)
FF5 Alpha	0.19 (1.95)*	0.09 (2.13)**	0.06 (1.84)*	0.07 (2.61)***	0.07 (-0.20)	-0.01 (1.83)*	0.04 (1.92)*	0.06 (1.76)*	-0.01 (1.94)*	-0.10 (2.31)**	0.29 (2.48)**	11.22 (0.03)

The above table depicts the risk-adjusted performance of the decile equally weighted asset growth portfolios. Data comprises of all non-financial firms share/stocks listed on PSX from January 2000 till December 2017. Data is sorted in ascending order at month (t) to estimate asset growth values by using 72 months rolling window of observations and all portfolios are rebalanced monthly. The decile portfolio P1 represents stocks with the lowest estimated asset growth and the decile portfolio P10 shows stocks with the highest estimated asset growth and P1-P10 is the spread between the lowest asset growth portfolio (P1) and highest asset growth portfolio (P10). CAPM alpha, FF3 alpha, and FF5 alpha show the annualized estimation of alphas derived from CAPM, Fama-French three-factor, and Fama-French five-factor respectively. Results of t-statistics are reported in parentheses showing the statistical significance at different levels (* at 10%, ** at 5%, and *** at 1%). Finally, the Wald test reports chi-square statistics referring to the null hypothesis that all ten alphas of decile portfolios are jointly equal to zero and their p-values are in parenthesis below the statistic.

Table 2 above specifies Equally Weighted (EW) asset growth portfolio's Jensen Alpha. Moreover, similar to table 1, this table has 10 portfolios, three-factor of Fama and French Jensen alpha, Fama and French five-factor, and another CAPM. The values below Jensen alpha is the t-value of each portfolio concerning each model. The results of this test on an equally-weighted asset growth portfolio using the Fama-French Factor 3 factor, Fama-French 5 factor and CAPM models show that P1 has Jensen alpha of 0.20, 0.19, and 0.19 and t- the value of 1.92, 1.97, and 1.95 respectively. Whereas P10 has negative Jensen alpha of -0.09, 0.09, and 0.10 and t-values of positive 3.15, 2.45,

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and 2.31 in Fama and French factor 3, Fama and French factor 5 and CAPM respectively. This means that equally weighted returns of P10 are lower than P1 in all three models and the chi-square test results are significant in all three models as its value is less than 0.05, this explains the presence of cross-sectional variation in return between equally weighted portfolios. This explains that these models are misspecified and unable to capture asset growth anomaly indicating asset growth as an additional factor through which asset returns can be predicted in PSX.

Value Weighted Returns (VW Returns)

Table 3: VW Asset Growth Portfolios' Jensen Alpha

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P1-P10	WALD-TEST
CAPM Alpha	0.14 (1.32)	0.05 (1.98)**	0.02 (2.47)**	0.04 (0.71)	-0.01 (2.04)**	-0.05 (2.30)**	0.04 (0.72)	0.03 (1.86) *	-0.14 (1.70) *	-0.10 (2.00)**	0.24 (2.42)**	12.63 (0.02)
FF3 Alpha	0.16 (1.33)	-0.06 (1.84)*	-0.04 (2.46)**	-0.01 (0.49)	-0.03 (2.43)**	-0.02 (2.45)**	0.04 (0.21)	0.03 (1.48)	-0.16 (1.88) *	-0.13 (1.86) *	0.29 (2.34)**	9.69 (0.04)
FF5 Alpha	0.15 (1.30)	0.01 (1.96)**	-0.03 (2.95)***	-0.01 (0.72)	-0.02 (2.68)***	-0.05 (2.28)**	0.05 (0.01)	0.08 (1.41)	-0.15 (1.82) *	-0.14 (1.95)*	0.29 (2.20)**	9.25 (0.00)

The above table depicts the risk-adjusted performance of the decile value-weighted asset growth portfolios. Data includes all non-financial firms shares listed on PSX from January 2000 till December 2017. Data is sorted in ascending order at month (t) to estimate asset growth values by using 72 months rolling window of observations and all portfolios are rebalanced monthly. The decile portfolio P1 represents stocks with the lowest estimated asset growth and the decile portfolio P10 contains stocks with the highest estimated asset growth and P1-P10 is the spread between the lowest asset growth portfolio (P1) and highest asset growth portfolio (P10). CAPM alpha, FF3 alpha, and FF5 alpha present the annualized estimation of alphas derived from CAPM, Fama-French three-factor, and Fama-French five-factor respectively. Results of t-statistics are reported in parentheses indicating the statistical significance at different levels (* at 10%, ** at 5%, and *** at 1%). Finally, the Wald test reports chi-square statistics referring to the null hypothesis that all ten alphas of decile portfolios are jointly equal to zero and their p-values are in parenthesis below the statistic.

Table 3 above depicts Jensen's alpha of the VW asset growth portfolio. Similar to Tables 1 and 2 of this empirical study, there are 10 portfolios in Table 3. This table describes the result of Jensen alpha for the Fama-French 3 factor, Fama-French 5 factor, and CAPM. The values below Jensen alpha is the t-value of that particular portfolio concerning the specific model. The results of this test on value-weighted asset growth portfolio using CAPM, Fama and French 3 Factor, Fama and French factor 5 models illustrate that P1 has Jensen alpha of 0.14, 0.16, and 0.15 and t- the value of 1.32, 1.33 and 1.30 respectively. Whereas P10 has Jensen alpha of -0.10, -0.13, and -0.14 and t-values of 2.42, 2.34, and 2.20 in Fama and French factor 3, Fama and French factor 5 and CAPM respectively. This means that returns of P1 are higher than P10 in all three investigated models even

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in value-weighted portfolios which represent variation that is cross-sectional in returns among investigated value and weighted portfolios. Chi-square test results in all three models also demonstrate that results are significant and models are misspecified. Hence, it can be concluded that these models have not captured asset growth anomaly even in value-weighted portfolios in PSX.

Conclusions and Recommendations

The results of this research study depict that firms with a lower asset base provide better stock returns in comparison to firms with a greater asset base. Hence, findings support the presence of an anomaly in asset growth in the Pakistan Stock Exchange (PSX) as it is confirmed by descriptive statistical analysis and by calculating the risk-managed performance of stocks in EV and VW (equally weighted & value-weighted) decile portfolios. Furthermore, results of the Wald test and GMM depict that well-renowned asset pricing models i.e. FAMA 3 factor, FAMA 5 factor, and CAPM failed to captured asset growth anomaly in Pakistan Stock Exchange and are measured to be misspecified in determining asset returns. Hence, it can be concluded that asset growth is an additional factor through which asset returns can be predicted in the Pakistan Stock Exchange. Similar findings were identified by Fama and French (1993 and 2015) but it contradicts the output generated by FU (2014) in NYSE, AMEX, and NASDAQ markets.

Based on the findings of this research and considering all of the above discussions, it is suggested for investors planning to invest in Pakistan to develop a portfolio in which firms with lower asset growth have a greater weightage of their portfolio in comparison to firms with higher asset growth. As investors can benefit from this strategy by making greater returns. Another way investors can take advantage of the findings of this research study is that they can invest for the long term in firms, which have lower asset sizes and invest for the short to medium term in firms, which have higher asset size to get higher returns. For future research implications, various macro-economic variables can also be incorporated with asset growth anomaly in asset pricing models to measure the determination of anomaly of asset growth even in difficult macro-economic factors.

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