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Does Capital Asset Pricing hold in Pakistan Stock Exchange? An Application of Seemingly Unrelated Regression

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Abstract

The aim of the study is to critically evaluate role of Capital Asset Pricing Model with the respect to Pakistan Stock Exchange through applying Seemingly Unrelated Technique of Regression (SUR) model. The core crux of this research was to investigate new extrinsic opportunity of growth for the firms listed in Pakistan Stock Exchange by optimizing risk. The data set includes Jan-2014 to Dec-2016 comprising all industrial sectors listed at PSX and concluded on behalf of its volume. KSE-100 Index was kept as proxy for synthetic market portfolio. Composed portfolios are solely on non-financial firms of PSX. Trade volume was kept as benchmark for composition and split up them into ten set of portfolio depending on higher to lower side of trade volumes in descending order with assigning weightage to 10% each. Result witnessed that effect of market returns is solely base on trade volume. The results was assessed by using regression and Seemingly Unrelated Technique of Regression (SUR), moreover results also showcased, beta is quite significant except a single model, and the same with alpha exhibiting the value around zero, in the light of results, it has been concluded that CAPM holds in the context of PSX.

Keywords: *CAPM, Portfolio, Pakistan Stock Exchange, Seemingly Unrelated Regression*

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1. Introduction

1.1 Background

Portfolio theory is regard as the distinctive and up to date theory that predicts distribution of finance to the investor in order to handle it efficiently (Nofsinger, 2017) for the sake of protecting the market risk and return (Markowitz's, 1952). On the ground of portfolio theory CAPM (Capital Asset Pricing Model) has developed by Sharpe, (1963); Lintner, (1965) and Black, (1965). The theory is based upon illustrating the financer's risk that are being considered from the market perspective on the expected profits which relates with the expected cost of the share which is associated with the market risk (McNeil, Frey and Embrechts, 2015)

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CAPM (Capital Asset Pricing Model) focuses upon analyzing the risk and return on the investment. The model has the significant contribution on the current capital theory and investment. The purpose of CAPM is to increase the return and reduces the market risk that is associated with the investment (Prosad, Kapoor and Sengupta, 2015). The important aspect of the CAPM is to influence and directly predicts that how to assess the relations of risk and return on the investment (Fama and French, 1992). Sharpe, (1965) and Lintner, (1965) developed the CAPM that focuses to analyze the rate of return on the investment and along with this systematic risk and that risk is being evaluated with the beta.

Investors can only estimate the high return when the systematic risk is higher on the investment while on the other hand; low risk suggest the low return on the investment that suggest high beta produces high return where low beta decreases the rate of return on the investment (Elton and Gruber, 1995). The CAPM illustrates that return is associated with the risk free rate. Addition into this statement is being made that expansion of expected return which is associated with the risk free beta (Black, 1972). It is suggested that expected return is not having any relation with the market in regard with the lending or borrowing prevails the risk free borrowing (Fama and French, 1992; Ormos and Timority, 2016). The history suggests that CAPM is having poor performance in the market but considered as the necessary instrument for the finance (Fernandez, 2015); CAPM will not be effective in assessing the expected return if the market portfolio is not having efficient betas on the investment. CAPM has faced severe criticism by the critics as the model was presented to assess the expected return on the securities. In the primitive stage of the model it is not being refused by the financial analyst but now there are number of issues has been raised on the assessment of cross sectional forecasting of the model (Fama and French, 1992). The findings of the researchers suggested that there is a continuous and considerable effect on the share price and the profits (Michaelides, 2017). Researchers have different queries regarding the CAPM reliability and validity on the forecasting. It is also evident that there are other features exist in the market that can analyze the share price (McLean and Pontiff, 2016).

The theory of the CAPM is associated with the return that is having relation with the risk free rate. It is also being endorsed that return is associated with the risk free rate beta (Black, 1972). It is also suggested that when the market is having risk free borrowing then the expected return is not having any relation with the market borrowing (Fama and French, 1992). In the last three to four decades studies are being done in order to assess the reliability of CAPM to predict the expected market return. The researcher Reinganum, (1981) endorse the CAPM which is being presented by the Sharpe while on the other hand; Linter and Black are having serious issues on the practically results of CAPM. It is evident that for a longer period of time CAPM is widely being used in the finance but currently it is being assesses and criticized upon the effectiveness and helpfulness to assess return on the investment by using this concept (Michailidis et al, 2006). There are few important queries that required to be answered that are: What is the scope of CAPM validity in the Pakistani context? Is it possible that CAPM illustrates the surplus return? Is there any linear relation with the return and risk? It is pre-assumed that CAPM will be used for the daily trading as well for the pricing and management of risk in the long run financial tools. It is being suggested that in the short period of time the impact is comparatively irrelevant. It is perceived that center of the activities like the developing the standards for the investment efficiency comparatively responsible the large portion of the equity market then the single equities.

Research problem of the current study suggested that new era is bringing emerging markets that can provide the validation on the CAPM on new equity markets that will be increasing the scope of the investors to make investment which will increases their profitability and reduces the risk adequately (Shamim, Abid and Shaikh, 2014). The implementation of CAPM is concerned it is already assumed that there is a lack of perfect market in the Pakistani perspective. This assumption is not easy to achieve around the world but in the Pakistani context problem prevails because the government is the major stakeholder in the market, the issue of insider trading and depletion of investment out of the market. Research gap has been identified and for the sake of it the study is going to analyze the reliability and validity of CAPM in the Pakistan Stock market through the data of Karachi Stock Exchange of entire shares index. As far as; theory and empirical emerging and developed markets are different with each other due to their individual features. It is evident that the new markets of equity are in the development transition that requires more effectiveness and efficiency to become more productive for the investors.

Researcher presented different models in order to assess the equity pricing like the CAPM and Fama and French models. There are number of studies are being conducted by using the model with the help of data using the KSE-30 and 100 index as well but this study will be conducting the study using the entire stock index and data constitute upon 400 listed organizations in the Pakistan Stock Exchange with the limitation of availability of data. The data of the Pakistan Stock Exchange will be used during the period of 2014 to 2016. The development of portfolio is being done based upon the trading volume but in Pakistan there is a lack of researches conducted on the portfolio trading volume.

There are three research questions for the study such as: (1) Is there any relation between the risk and return? (2) Is there any possibility that return and risk become zero as indicated through CAPM? (3) Is the risk premium rate can be more than zero?

The purpose of the study is to analyze the CAPM is a fit model for the KSE entire share index; while there are other sub objectives also being developed by the researcher as follows:

- To analyze the effect of risk premium on the extra return gain on the individual based portfolio.
- To identify that return and risk can be zero.
- To examine the risk premium rate can be more than zero.

The current study is highly significance because its viability is based on the market scenario. It is evident that the developing countries are having different features in the stock market as compare to the developed countries stock market and Pakistan is a developing country that has certain limitations in the market. Internationally studies are being conducted in order to assess the asset pricing in the develop countries. The current study is being based on the Pakistani Stock Market and the portfolio development is based upon the trading volume along with this it is a different study because it involves the CAPM to assess the return and risk relation in the Pakistani stock market. This research will be helpful for the financial analyst, shareholders, stakeholders, financer and others.

The research was done in the Pakistani stock market selecting the KSE 100 index of non financial companies. There are certain limitations about the study which are as follows:

- The research findings are based only on the Pakistan Stock Market therefore; results cannot be generalized in other countries.
- In the study researcher has used the equality based portfolios but the value weighted portfolio was not selected; therefore; this limitation has the only one form of portfolio development.
- Portfolios were selected based upon trading volume. It is also possible that portfolio selection can be made on the basis of other features such as: Pricing, Liquidity and others.

2. Literature Review

Recent studies suggested that there are relations between the stock prices and the other factors of the stock markets (Yuan, 2015). The results of the study also suggested that in the market relations exists among the prices, return, cash inflow and out flows, trading volume and book to market ratio. From the study of Basu, (1977); suggested that price earning and risk adjusted return are related with each other but different studies offered that dividend yield and price of stock are having correlation with each other (Letzemberger and Ramaswomy, 1979). There are certain influences such as size of the market on the CAPM and Hypothesis of the market as well. CAPM illustrate that return is being produced through activities of cost fluctuation (Sadorsky, 2014). In the CAPM risk is considered as the Beta Value or represents the risk factor. The relation is having positivity when the high risk prevails on the stock that brings the high return. There are certain assumptions were developed before presenting the CAPM (Sharp, 1964; Lintner, 1965 and Moss, 1966). The assumption is being made that investor should be having consistency in the risk management along with the assets. The second assumption were made that investor should be borrowing or lending through the risk free rate (Nofsigner, 2017).

2.1 Stock Market Review

Global business consideration is that stock is the part of the owner's equity that presents the investment of the investor into the business in the form of assets and the revenues. Owner has the right to claim the distributed profit and return that is being generated through the organizational operations. As far as the shareholders are concern they are having certain limitation on the organizational profitability or return it is the organizational discretion to pay or not to the shareholders. Market plays an important role for the seller and buyer regarding the pricing and vole of stocks. Stock exchange enables the brokers to trade in the stock or securities at the place through the platform. Stock exchange also provides the opportunity to the brokers to trade and redeem the security and other financial instrument by getting the return and dividend on the shares.

In the stock exchange only those companies can trade their stock or shares that are listed in it the activities should be includes such as; issuance of shares, debenture, bond and others. In the past stock exchange was having the old system of book keeping which has been replaced with the help of technology and digitalization; now they are being traded through online features as well. In the first phase; investors place their offers of the share or debentures in the primary market and transactions are being conducted in the secondary market. Stock exchange has its significance in the country which facilitates the stock market to be revived through it. There is not official requirement that the shares are being issues or transactions are being done through the stock exchange it can be done through different means. Those transactions or trading that is being done outside the stock exchange are considered as the external trading from the exchange. Stock exchange illustrates about the country economic health and financial stability internationally. In 2008, US stock market constitute upon 36.6 trillion dollars. The local imitative market based upon 480 trillion dollar which is twelve times high of the total global economy.

2.2 Short introduction of the Pakistani's Economy

As far as the Pakistan's economy is concern; they have achieve considerable growth rate and made some changes in their structure in the last decade or so; but still the economy is having slow progress as compare to other countries. It is evident that the country is highly relied upon the agriculture sector and other sub sectors are for the purpose of the livelihood. It is important to know about the Pakistani economy that there is a feudal system exists that is about 5% of the overall population of the country but hold the 90% of the land resources of the country.

There are different theories about the market hypothesis that oppose the CAPM (Banz, 1981). The ideal stock market exists when the system or the information is adequately available to analyze the price of stock or securities (Barth et al, 2017). If the system of the required information is not available then it is really difficult for the organization to trade in the market. In the developing countries people use their cognition and rationale to make any decision of investment in the stock market and it is evident that high profitability organizations are the focus of the investors to invest in order to gain the profit or high return on their stocks. Similarly; as the prices of the sock decreases the rate of return also decreases (Nofisnger, 2017).

It is a myth that organization size matters in deciding the prices of the stock. There are number of studies that suggest different stories about this myth; it is being suggested by the Banz that organization is required to develop diversity in their portfolio and they should be having five different categories on the basis of organizational size. There are other features that focuses upon the organizational size is effective and adverse factors illustrates the organizational market value in view of the small size organization as compare their Beta values with the other organizations (Li, Qiu and Shen, 2017).

There is a different perspective suggest that organization size effect the time series performance (Schmidt et al, 2017). The analysis is being done on the small organization that prices of the portfolio is large in the beginning of the fiscal year but remain low through the years. The results of the study suggest that size has influence in the year's first month and it become more effective about 25% in the first week of the month in the whole year. Therefore; it is suggested that the size influence depends upon the seasonal change. The study includes different methodology which suggests size impact for the specific period in the year which shows the season effect only (Schmidt et al, 2017). Investors take their decision with the association of hazard and the return which is associated with it (Kevin, 2001). Return is dependent upon the hazard and experts of finance reduce the infidelity through the expansion of risk. The financial analyst brings the new dimension in the portfolio through the different setting and arrangements of stock or securities. It is evident that every

portfolio is not highly beneficial for the investors. Therefore; these financial experts required to focus upon those securities that are having high return and bring opportunity to invest more (Niavand and Nia, 2017). In the Pakistani context the security or stock market is highly volatile and vulnerable for the investor. As the hazard is having intensity then the impact on the market is also high. In other words; as the hazard increases the likelihood of arrival is also at the higher side. It is important to consider the hazard should be having low intensity which reduces the risk intensity; analyst can distinguish the damage of the conjecture through resources should be utilized to manage the available resources. Every conjecture estimated return that increases the probability to get profit. Therefore; CAPM facilitate the investor to assess the hazard and return on the expected risk (Schmidt et al, 2017).

It is evident that stock prices become high of the organization when the investor supposed that in the preceding years the growth rate was not effective (Niavand and Nia, 2017). It is analyzed by the investors that large size organization overestimated while the small organizations are underestimated. It is evident that the stock that are high become attractive for the investors rather than the low equity stock because it allows them to increase the price of the stock and generate expected return on the stock. For the sake of this research is being done in order to analyze the size and value of the stock is effective and variation is being observed in the return and prices (Kenz and Ready, 1997; Fama and Macbeth, 1973). The results of the study suggested that the size is influential therefore it increases monthly by 1%. The argument was made the small size stock and stock value did not increased because of the consistency is being observed with the changing trend in the prices of the stock along the other factors (Sornette, 2017). That is considered as the market behavior than the change in the risk and return due to the prices of the stock.

As far as the Karachi Stock Exchange is concern; it is highly problematic to present the behavior of the stock return because it is not symmetrical in nature (Sajid and Qureshi, 2017). In period of 1989 to 1993 there was no change of the season on the stock market. There are few studies that suggest CAPM is highly effective for the Karachi Stock Market (Ahmad and Zaman, 2000). In that case; return is positive for the investor but with it there is an influence upon the stock prices. The argument made by the Sajid and Qureshi, (2017); that return cannot be presented with the symmetrical way.

The CAPM findings are positive for the KSE but the other factors are being considered to speculate the information. The information that can be speculated is: return, exchange rate, oil prices, high inflation and others (Sarwar and Scholar, 2017). The stocks that are having low capital contain high risk because it is not possible for the organization to manage the risk of the market and change market condition for the investors (Little, 2008). It is being suggested that investors are having benefits which are associated with the small stock organizations. Small organizations are having high return although the nature of the stock is low. Small organizations are having trend to revert to the market uncertainty rather than the large stock organizations (Sarwar and Scholar, 2017).

Those organizations that are having small stock prevails risk that affect the organizational portfolio. Risk premium is having relational impact upon the risk premium (Harvey and Siddique, 2000; Baronee Adesi, Gagliardini and Urga, 2004). The study suggest that USA small stock organization are paying off about 17% on every month on the stock due to the risk premium relates with the stock as compare to the large stock organizations (Pastor, 2000). The study was conducted on the diversification of risk and return in the diversified firm (Chang and Thomas, 1989). The study includes the hypothesis upon the variables of risk, relation of risk and diversification. The results of the study illustrate that diversified organizations are having relation with the risk and return.

The further results suggested the organizations are focusing upon the irrelevant diversified efficiency that impact in the form of incompetent strategies. Organizations that are having incompetent market diversification strategies found difficulty in the market. Those organizations that are having competent diversified strategies decrease the risk factor that increases the chances of high return (Kaul, Nary and Singh, 2017). The results of the study illustrate diversified organization are being distinguished on the managerial factors; this differentiation is the part of reducing the risk through increase performance and efficiency to increase the return of the stock.

Utility theory is having advantage in order to take decision regarding the stock risk and return. The theory is having problem that it does not enable the organization to assess the risk and return of the organization. The focus of the study is towards the utility that is consistent in assessing the stock risk and return (Beach and Lipshitz, 2017). The change is being observed in the horizon value which is associated with the portfolio management that has no effect on the risk which is related with the arbitrary rate of return (Chandra and Prasanna, 2017). It is supposed that low risk is associated with the portfolio management which is being presented to assess the return rate. It is evident that organization can control

the risk in the portfolio management but not able to control the market associated risk. From the organizational perspective it is necessary to manage the risk in a control way to assess the risk and making the decision towards the investor's perspective to accept the return on their selected portfolio investment. It is evident that high risk of immunization if the portfolio returns on the assets of the organization is not being related to it (Chandra and Prasanna, 2017). Therefore; investors expects the high return the reason is that risk is attached with the market speculation which can be reduced through the organizational efficiency that will increases the return on the investor's portfolio. Currently CAPM and other models implementation is the biggest issue for the organization because risk and return is having ineffective measures to develop the model which can predict about the risk and return for the economy. There are different researches illustrates that large capital organization facilitate and motivate their investors to focus upon the long terms perspective; but it is a fact that investors focuses upon the short term investment because in the Pakistani context stock market is highly uncertain which urges the investor to invest in the short term period (Theron and Van Vuuren, 2018).

The study was conducted in order to assess the return of the market and stock which should be managed on the basis of earning price ratio, then the return will be higher of the earning per share which can be forecasted through the CAPM and it will be helpful for the future return as well (Basu, 1977). Liquidity of stock market illustrates the organizational liquidity with the help of investors in order to highlight the reduced profitability which is being expected by the investor to get the low return on the investment. The model of liquidity risk the significant shock is associated with the low return and high return in the future. The study was conducted on the non theoretical extension in the Pakistan's Security Exchange (Ahmed and Rosser, 1995). The use of ARCH models being used on day to day security exchange for the analysis purposes. In that study researcher has used two different variables such as exchange rate and State Bank of Pakistan index; it is being assessed that Pakistan Stock market is having unpredictable trend which are difficult to forecast because the speculation exist in the market which has an impact upon the return and risk on the stock (Theron and Van Vuuren, 2018).

The examination of the CAPM is being required in the Pakistani context because it is important to assess the functionality of the CAPM in the Pakistan's capital market and for the sake of this data is being selected from the equity market which is Pakistan Stock Exchange listed companies during the period of Dec 23, 2008 to Feb 26, 2010 and top 20 companies are for the data analysis. Researcher has also used the treasury bills rate. Researcher has used the proxy of the market portfolio as the substitute of market 100 index and for the purpose of determines the beta of the stock least square methods is being used along with the regression equation. Researcher is going to be determined the validity of the CAPM through the coefficient of regression equation (Vendrame et al, 2018).

There is no evidence found about the beta has the linear relations with the return on stock during the period of February, 2009 and January, 2013. From the market perspective once variable is important that is beta and from the perspective of CAPM systematic risk is being influenced the estimated stock return (Stefanova et al, 2017). Pakistan's stock market is an emerging market where the induction of residual variance findings has been rejected. The results of the CAPM validity do not support.

The portfolio development and investment decision suggest that non linear relation exist between the risk and return. Researcher has also used the market proxy that does not support the CAPM. As far as the portfolio managers can be segmented into two categories that are passive and active managers. Passive managers considered that securities that are having inappropriate pricing did not highlighted; therefore; they manage portfolio through the take off some set of stocks (French, 2017).

This research is based upon the examining the validity of CAPM in the financial recession and this research paper intended to bring some evidence that support the execution of CAPM to the listed companies of Karachi Stock Exchange with the selected sample of 50 listed companies from different sectors. Researcher has collected the data from three different periods such as: financial recession of 2005 to 2007; other includes 2008 to 2010 and final period is 2011 to 2013. Researcher has used the statistical interface such as regression in order to test the hypothesis on the independent variable which is 100 index and stock return as the dependent variable. There are three significance levels are being used to test the hypotheses that are 0.01, 0.05 and 0.1. According to the research paper the results are not supportive that beta and stock return is having relations with each other but for the purpose of analyzing the CAPM is to be used to get the information for the investors that have invested in the securities that contain risk (Bakhsh A, et al, 2016).

2.3 Hypotheses

- H1: The intercept coefficient is equal to zero as predicted by CAPM.
- H2: The average risk premium is significantly non-zero.

3. Research Methodology

3.1 Research Design

The present work empirically tests the CAPM in the context of Pakistan Stock Exchange and the share price and market index data for a series of daily data for 3 years, implying to be a purely quantitative study.

3.2 Sample Selection and Criteria Limitation

The sampling criteria of the study is based on the application of CAPM in an emerging economy; hence the Pakistani market has been taken as the proxy of the emerging market. The daily data for KSE 100 index listed companies was collected for the period of Jan 1, 2014, to Dec 31 2016. The availability of the data for the said period was the reason for the selection of the period as the time limit of completing the study was a barrier due to academic requirement.

3.3 Data collection

The study collected secondary data for the stocks listed in KSE 100 index for constructing the portfolios. The data for stock prices and market index was collected, and portfolio returns were calculated in several steps. The data was collected from the official website of the Pakistan Stock Exchange.

3.4 Portfolio Formation

The portfolios were formed for the companies listed in Pakistan Stock Market. The companies were sorted in descending order using the volume of trade as the base and ten equally weighted portfolios were formed. The total of 100 companies were divided in ten deciles.

3.5 Model Specification (CAPM-Single Factor Model)

The Capital Asset Pricing Model (CAPM), given the systematic risk of that is represented by its beta, if the investors' portfolio is formed in a well manner, then the model may quantify the relationship of expected return of the portfolio and the beta given. The Capital Assest Pricing Model claims the market beta to be only risk factor that is priced in stock returns.

The single factor CAPM can be expressed as follows:

$R_{it} = R_f + (R_{mt}-R_f)\,\beta$ . ..(1)

With t = 1, 2, 3….T

Where R_{it} represents the expected return on a stock *i* in time *t, Rf* represent the risk free rate of return, R_{mt} - *Rf* represents the market risk premium. The coefficient β_{it} is the risk sensitivity of returns for market risk.

In order to test the CAPM, a multivariate regression framework was used by transforming the above equation into a simple time series model as follows:

$$R_{it} - R_f = \alpha_i + (R_{mt} - R_f)\beta_{1t} + \in_t \quad \ldots(2)$$

$$ER_{it} = \alpha_i + (R_{mt} - R_f)\beta_{1t} + \in_t \quad \ldots(3)$$

Where $ER_{it} = R_{it} - Rf$ represents the excess return on stock in time *t,* α_i is the intercept of the regression equation representing the non-market return component ϵ_t represents the error term which is the random return component due to unexpected events related to a particular stock *i*. For the purpose of simplification, it is assumed that ϵ_t has a multivariate normal distribution and is independently and identically distributed over time.

The above model represents the single factor model for an individual stock. This model can be used for portfolios of stocks as well. By replacing the *i* with a p to represent a portfolio of stocks, the single factor model CAPM can be expressed as follows:

$$ER_{pt} = \alpha_p + (R_{mt} - R_f)\beta_{1t} + \epsilon_t \quad \ldots(4)$$

Where ER_{pt} is the excess return of the portfolio in time *t*, α_p is the average of all individual alphas of the stocks included in the portfolio.

3.6 Variable Estimation

3.6.1 Daily Portfolio and Market Returns

The returns for an individual stock *i* where estimated as follows:

Where P_t *and* P_{t-1} are the closing prices on day *t* and *t – 1* respectively. R_{pt}, portfolio returns are the weighted average returns of individual stocks.

$$R_{it} = LN[\frac{P_t}{P_{t-1}}]$$

Where P_t *and* P_{t-1} are the closing prices on day *t* and *t – 1* respectively. R_{pt}, portfolio returns are the weighted average returns of individual stocks.

$$R_{pt} = \sum_{i=1}^{N} W_i R_{it}$$

Similarly the market portfolio returns can be estimate as follows:

$$R_{mt} = LN\left[\frac{KSE(ALL)_t}{KSE(ALL)_{t-1}}\right]$$

Where $KSE(ALL)_t$ and $KSE(ALL)_{t-1}$ are the closing index values on day *t* and *t – 1* respectively.

The portfolio and market returns are used to estimate the excess portfolio returns $(R_{pt} - Rf)$ and market risk premium $(R_{mt} - Rf)$.

3.6.2 Hypotheses

H1: $\alpha_p \neq 0$

H2: $\beta_{it} \neq 0$

For CAPM to hold *H1* should be rejected and α_p should be non- significant because if α_p is significant then this might lead to a conclusion that the model is not well specified and there is an existence of omitted variable bias. *H2* should be accepted and β_{it} should be significant because if it is not significant then this might lead to a conclusion that the market risk factor fails to explain the variation in the returns of the portfolio.

3.6.3 Seemingly Unrelated Regressions

A seemingly unrelated regression (SUR) system comprises several individual relationships that are linked by the fact that their disturbances are correlated. Such models have found many applications. For example, demand functions can be estimated for different households (or household types) for a given commodity. The correlation among the equation disturbances could come from several sources such as correlated shocks to household income. Alternatively, one could model the demand of a household for different commodities, but adding-up constraints leads to restrictions on the parameters of different equations in this case. On the other hand, equations explaining some phenomenon in different cities, states, countries, firms or industries provide a natural application as these various entities are likely to be subject to spillovers from economy-wide or worldwide shocks.

There are two main motivations for use of SUR. The first one is to gain efficiency in estimation by combining information on different equations. The second motivation is to impose and/or test restrictions that involve parameters in

different equations. Zellner (1962) provided the seminal work in this area, and a thorough treatment is available in the book by Srivastava and Giles (1987). A recent survey can be found in Fiebig (2001).

3. Data Analysis

This chapter includes the analysis of the collected data. First the descriptive statistics of the data are presented then the main regression analysis of the data is presented.

Table 1: Descriptive Statistics for 10- Portfolios Based on Trade Volume

	Mean	Maximum	Minimum	Std. Dev.
P1	0.070	8.39	-8.32	1.365252
P2	0.077	5.57	-5.78	1.088112
P3	0.103	6.37	-6.32	1.161259
P4	0.093	4.97	-5.34	1.043753
P5	0.126	5.51	-4.29	0.92814
P6	0.111	3.77	-3.77	0.795945
P7	0.090	2.73	-2.58	0.649824
P8	0.108	1.72	-2.1	0.435964
P9	0.096	1.8	-1.13	0.364538
P10	0.077	1.47	-4.03	0.321534

3.1 Descriptive statistics of the 10 portfolios

The above table 4.1 of descriptive statistics of the 10 portfolios constructed in this study shows the Mean, Standard deviation, maximum and minimum portfolio returns. Portfolio P5 has the highest average returns with the mean value of 0.126 showing that the average return for this portfolio is 12.6% while the Portfolios P1, P2 and P10 are the low return portfolio ranging from 7% to 7.7%. Portfolio P3, P4, P8 and P9 are having the value ranging from 9% to 10.8% while P6 is having the average return of 11.1%. By looking at the overall table one can easily note that the P5 and P6 are the highest average return portfolios depicting that the stock with the trade volume of middle range are having high average returns.

While looking at the standard deviation we can notice that portfolio P10 is having the lowest standard deviation of 32% which means it is the low risky portfolio while portfolio P1 is the most risky portfolio on the basis of standard deviation having the value 1.36 which is 136% variation and considered a high deviation. The P8 and P9 are having the standard deviation of 43 and 36% respectively. While portfolios P2, P3 and P4 are ranging between 1.08 to 1.16 having high standard deviation and P5, P6 and P7 are having the values of 92%, 79% and 65% respectively. The table also shows the minimum and maximum value of returns.

3.2 Stationarity Diagnostics

The stationarity of a time series data is very important and it can influence the behavior of the variables and it can also influence the properties of the variables for example infinite shocks in the for non-stationarity series. If the series of variable is non-stationary and it is used in the model then the analysis are not valid. Hence it can be said that the t-ratios will not follow the t distribution and the hypothesis testing of the regression model will be questionable.

The stationarity of the variables included in this study are was also tested and the results are presented in the following.

Table 2: Unit Root for Market Return

	Augmented Ducky Fuller			
	At Level		**At 1st Difference**	
Variables	*Statistic*	*Prob.*	*Statistic*	*Prob.*
RMT	-23.1339	0.00		
Portfolio # 1	-24.1039	0.00		
Portfolio # 2	-22.9071	0.00		
Portfolio # 3	-23.5131	0.00		
Portfolio # 4	-24.2202	0.00		
Portfolio # 5	-23.6916	0.00		
Portfolio # 6	-15.7163	0.00		
Portfolio # 7	-22.0426	0.00		
Portfolio # 8	-20.0721	0.00		
Portfolio # 9	-12.2281	0.00		
Portfolio # 10	-17.8269	0.00		

The above results for unit root show that all the series of the variables are stationary and there is not unit root in the series. Hence it can be said that the issue of non-stationarity does not exist in any of the variable and all the variables are stationary at the level as we can see the p-values for of Augmented Dickey-Fuller (ADF) are all significant. Hence rejecting the null hypothesis of unit root.

3.3 Regression Analysis

As discussed earlier in the methodology part that we applied a system of regression to analyze the 10 portfolios constructed on the basis of trade volume and kept the market returns as independent variable to understand the role of market returns on the returns of given portfolios. The regression method used to estimate the betas was seemingly unrelated equations. It is useful for estimating a system of regressions and to overcome the issue of autocorrelation.

Table 3: Results of Seemingly Unrelated Regression

		Coefficients	**t-values**	**P-values**
P1	α	0.076095	0.606072	0.5445
	β	3.623338	1.498172	0.1341
P2	α	0.079853	0.740005	0.4593
	β	3.514469	1.979078	**0.0478**
P3	α	0.107203	0.281612	0.7782
	β	1.428118	2.488298	**0.0129**
P4	α	0.09252	0.546287	0.5849
	β	2.483776	2.395192	**0.0166**
P5	α	0.124838	0.232789	0.8159
	β	0.94144	3.633589	**0.0003**
P6	α	0.112895	0.524598	0.5999
	β	1.820782	3.828654	**0.0001**
P7	α	0.089914	0.153674	0.8779
	β	0.435095	3.737973	**0.0002**

P8	α	0.105004	1.867311	0.0619
	β	3.539651	6.520069	**0.0000**
P9	α	0.092826	2.832244	0.0046
	β	4.47712	6.91245	**0.0000**
P10	α	0.077758	0.423852	0.6717
	β	-0.595611	6.50224	**0.0000**

3.4 Summary of Seemingly Unrelated Regression Results

The above table 4.3 shows the results from of regressions. The 10 regression were run as a system of equation using seemingly unrelated regression and found that 9 out of 10 beta coefficients were significant. Only the beta of in the model 1 having the P1 returns was insignificant. Showing that the return of the portfolios based on the trade volume have impact of market returns. These securities have likely hood to move in the similar direction of the market movement. The p-values for most of the alphas are insignificant showing the risk free return is significantly zero.

3.5 Interpretation of Hypothesis

H1: $\alpha_p \neq 0$

H2: $\beta_{it} \neq 0$

As discussed earlier in the methodology chapter that for CAPM to hold *H1* should be rejected and α_p should be non- significant because if α_p is significant then this might lead to a conclusion that the model is not well specified and there is an existence of omitted variable bias.

H2 should be accepted and β_{it} should be significant because if it is not significant then this might lead to a conclusion that the market risk factor fails to explain the variation in the returns of the portfolio.

3.5.1 Explaining H1: $\alpha_p \neq 0$

The first alternate hypothesis of this research is that alpha is not significant. Which means that the model is well specified and there does not exist omitted variable bias. If we look at the results of regression in the above table we can notice that almost all p-values for constant are insignificant having the value more than 0.05. Showing that the null hypothesis $\alpha_p \neq 0$ is rejected and we found that the result of the current study are in-lined with the hypothesis.

3.5.2 Explaining H2: $\beta_{it} \neq 0$

The second alternate hypothesis of the study is H2: $\beta_{it} \neq 0$. Which means that the market risk explains the variation in the returns of the portfolio and we tend to accept this hypothesis. If this hypothesis is rejected than it mean that the market risk factor fails to explain the variation in the returns of the portfolio. By looking at the regression results in the above table we find that the all of the beta coefficients of market return are significant with the p-values less than 0.05 except the model of P1. Hence we can conclude that market risk is successful in explaining the variation in portfolio returns and the results are aligned with the hypothesis claimed in the study earlier.

4. Discussion

There are three main questions that were required to be answered after conducting this study that are: Is the CAPM effective in the Pakistani context? Do the CAPM illustrate the excess return? Is there any linear relation between risk and return? Prior to the study there is an assumption were made that CAPM is going to be used for the daily trading along with this it will be used for the pricing and management of risk in long term financial measurement. It is suggested that short run impact is not having significance. It is also being assumed that the developing of standard on the investment performance only be responsible on the major equity sector not the individual selected equity portfolio.

Recent studies suggested that there are relations between the stock prices and the other factors of the stock markets (Yuan, 2015). The results of the study also suggested that in the market relations exists among the prices, return, cash inflow and out flows, trading volume and book to market ratio. From the study of Basu, (1977); suggested that price earning and risk adjusted return are related with each other but different studies offered that dividend yield and price of

stock are having correlation with each other (Letzemberger and Ramaswomy, 1979). There are certain influences such as size of the market on the CAPM and Hypothesis of the market as well. CAPM illustrate that return is being produced through activities of cost fluctuation (Sadorsky, 2014). In the CAPM risk is considered as the Beta Value or represents the risk factor. The relation is having positivity when the high risk prevails on the stock that brings the high return. There are certain assumptions were developed before presenting the CAPM (Sharp, 1964; Lintner, 1965 and Moss, 1966).

The aim of the study was to examine the implementation of CAPM in Pakistan Stock Exchange. For the sake of this 400 stock data was collected and also 400 stock returns were also measured along with this market return as well. Afterwards; about 10 portfolios were develop which is based upon the volume trading and every portfolio is having about 40 stock exchange listed companies. The data analysis conducted and found that majority of the hypothesis are having significance and as far as the market return is concern it is likely to illustrate the deviation in the security return in the case of portfolio development is based upon trading volume of stock that can forecast the return of stock. Hence this research will be effective and valued in the current scenario in the available knowledge.

5. Conclusion

In the current financial market; there different pricing models for assets were developed few are in still exist while many of them did not provide legitimate information so it is being obsolete. Here in this study researcher has conducted the study on the CAPM of Fama and French along with the three factors of CAPM. In the some market internationally CAPM has given the significant results but in different countries Fama and French three factors CAPM was significant. There are some experts that suggest beta is the only factor that is effective for the hazard factor in order to decide the return; others did not agree on this phenomenon. This study was bringing the answer of the query that which pricing model is effective in forecasting the expected return. There are different studies attempted in order to test the pricing models in the Pakistani context but Fama and French model of three factor is having highly significant features (Javid and Etazaz, 2008; Mirza Nawazish, 2008). It is suggested that different mixes can be used to analyze the size and esteem premium such as the monthly data can be replaced with the daily or weekly data. It is also suggested that model should be used when the portfolios are not being arranged and it is required to test other previous years that might give the better picture of estimate on the trade volume premium.

It is evident that CAPM is the most significant model in order to make decision about the investment and changes are being made in to it to make it fit for the economy. There are different issues were faced by the researchers during the testing of this model. The researchers faced large number of problems when they tried to investigate the investment and its impact on the daily and with the selected time period which was not significant to suggest the actual investment in other period of time. The challenges and ambiguities of the studies are the distinctive feature for the future researchers by developing different hypothesis and its implementations. Research gap still exist in the market that can be filled by taking new factors into consideration because every researcher has some limitation such as time and shortage of resource therefore; different aspects and features were not covered in the study that created the gap in the research studies. Future researcher is suggested to focus upon new variables for the study that can helpful in predicting the results significantly and bring the new model to assess the return and risk relations in the long run.

References

Bakhshandeh, S. (1990). The relationship between risk and return in Tehran stock market: MSc of Marketing Management thesis. *Tehran, Tehran University*.

Barth, M. E., Gee, K. H., Israeli, D., & Kasznik, R. (2017). Stock Price Management and Share Issuance: Evidence from Equity Warrants.

Basu, A. (1977). Asymmetric Correlations of Equity Portfolios. *Journal of Financial Economics*, *63*, 443-494.

Beach, L. R., & Lipshitz, R. (2017). Why classical decision theory is an inappropriate standard for evaluating and aiding most human decision making. *Decision Making in Aviation*, 85.

Butler, K. C., & Joaquin, D. C. (2002). Are the gains from international portfolio diversification exaggerated? The influence of downside risk in bear markets. *Journal of International Money and Finance*, *21*(7), 981-1011.

Chandra, Prasanna. *Investment analysis and portfolio management*. McGraw-Hill Education, 2017.

French, J. (2017). The one: A simulation of CAPM market returns. *The Journal of Wealth Management*, *20*(1), 126-147.

Kaul, A., Nary, P., & Singh, H. (2017). Who Does Private Equity Buy? Evidence on the Role of Private Equity From Buyouts of Divested Businesses. *Strategic Management Journal*.

Kenz, C. S., Ready, W., & Lai, S. C. (1997). International diversification with large-and small-cap stocks, Working paper, WFA, Vancouver, Canada.

Li, K., Qiu, B., & Shen, R. (2017). Organization capital and mergers and acquisitions.

Masood, S., Saghir, G., & Muhammad, W. (2012). The capital asset pricing model: empirical evidence from Pakistan.

McLean, R. D., & Pontiff, J. (2016). Does academic research destroy stock return predictability?. *The Journal of Finance*, *71*(1), 5-32.

McNeil, A. J., Frey, R., & Embrechts, P. (2015). *Quantitative risk management: Concepts, techniques and tools*. Princeton university press.

Michaelides, M. (2017). *Revisiting the CAPM and the Fama-French Multi-Factor Models: Modeling Volatility Dynamics in Financial Markets* (Doctoral dissertation, Virginia Tech).

Niavand, H., & Nia, F. H. (2017). The Factors affect equity investors in India. *International Journal of Business and Economic Development (IJBED)*, *5*(3).

Nofsinger, J. R. (2017). *The psychology of investing*. Routledge.

Ormos, M., & Timotity, D. (2016). Generalized asset pricing: Expected Downside Risk-based equilibrium modeling. *Economic Modelling*, *52*, 967-980.

Prosad, J. M., Kapoor, S., & Sengupta, J. (2015). Theory of Behavioral Finance. *Handbook of Research on Behavioral Finance and Investment Strategies: Desicion Making in the Financial Industry, Hershey*, 1-24.

Sadorsky, P. (2014). Modeling volatility and correlations between emerging market stock prices and the prices of copper, oil and wheat. *Energy Economics*, *43*, 72-81.

Sajid, M., & Qureshi, J. A. (2017). Volatility of Secondary Market with Perspective to Brokers Role: An Empirical Study of Pakistan Stock Exchange. *RADS Journal of Social Sciencess & Business Management*, *4*(2), 1-21.

Sarwar, T., & Scholar, M. S. (2017). Master Of Science In Management Sciences (Finance).

Schmidt, P., Von Arx, U., Schrimpf, A., Wagner, A., & Ziegler, A. (2017). On the construction of common size, value and momentum factors in international stock markets: A guide with applications.

Shamim, M. A., Abid, Y., & Shaikh, E. A. (2014). Validity of Capital Asset ricing Model in Pakistan's Capital Market (Karachi Stock Exchange). *Journal of Emerging Issues in Economics, Finance and Banking*.

Shamim, M. A., Abid, Y., & Shaikh, E. A. (2014). Validity of Capital Asset ricing Model in Pakistan's Capital Market (Karachi Stock Exchange). Journal of Emerging Issues in Economics, Finance and Banking (JEIEFB), An Online International Research Journal, 3.

Sharpe, W. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. Journal of Finance, 19, pp. 425-442.

Sharpe, W. and Cooper, G. (1972). Risk-Return Classes of New York Stock Exchange Common Stocks, 1931-1967. Financial Analysts Journal, 28(2), pp. 46-54.

Shefrin, H. (2015). The behavioral paradigm shift. *Revista de Administração de Empresas*, *55*(1), 95-98.

Sornette, D. (2017). *Why stock markets crash: critical events in complex financial systems*. Princeton University Press.

Theron, L., & van Vuuren, G. (2018). The Maximum Diversification investment strategy: a portfolio performance comparison. *Cogent Economics & Finance*, (just-accepted), 1427533.

Vendrame, Vasco, Cherif Guermat, and Jon Tucker. "A conditional regime switching CAPM." *International Review of Financial Analysis* 56 (2018): 1-11.

Yuan, Y. (2015). Market-wide attention, trading, and stock returns. *Journal of Financial Economics*, *116*(3), 548-564.