Volume and Issues Obtainable at Center for Sustainability Research and Consultancy

Journal of Accounting and Finance in Emerging Economies

ISSN: 2519-0318 ISSN (E) 2518-8488

Volume 7: Issue 1 March 2021

Journal homepage: www.publishing.globalsrc.org/jafee

Anticipated Volatility, Unanticipated Volatility Shocks, Excess Monthly Returns and Stock Market Behavior of Pakistan

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ARTICLE DETAILS	ABSTRACT
History <i>Revised format: January 2021</i> <i>Available Online: March 2021</i>	An investor considers various factors to choose the financial assets. The portfolio theory suggests that risk, return, taxes, information and liquidity are vital factors in portfolio choice. The study is based on risk premium, uncertainty, shocks and volatility of Pakistan stock exchange market. The study has used monthly time series data of returns of ten sectors of Pakistan stock market ranging from 2006 to 2014 to measure the anticipated and unanticipated factors of risk, return and uncertainty. Using CAPM, it is pointed out that volatility factor is present and high in overall stock market and the level of volatility in different sectors of the market moves in the same direction which suggest that speculative activities are widely spread in every sector and in overall market as well.
Keywords <i>Volatility, Shocks, Returns, Stock Market.</i>	
JEL Classification: <i>M40, M41</i>

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Recommended citation: Sheikh, M. R., Zameer, S. & Siddiqui, S. H. (2021). Anticipated Volatility, Unanticipated Volatility Shocks, Excess Monthly Returns and Stock Market Behavior of Pakistan. *Journal of Accounting and Finance in Emerging Economies*, 7(1), 77-91

1. Introduction

Risk theory states that the investors are unwilling to invest in a risky asset due to fear of loss of their wealth unless they ensure that their risk will be compensated. The difference between the returns of on risky asset and risk-free asset is known as risk premium. According to the CAPM, as risk increases in financial market, the return on risky assets also increases. If this proposition does not hold, it means that the investors do not have complete information, or they are risk neutral (Ahmad and Zaman, 2000).

Karachi Stock Exchange has been classified on of the best and emerging financial markets during 1990s. To observe the variations in the prices of stocks, uncertainty, volatility in Karachi Stock Exchange, various studies have been conducted. Khiliji and Nabi (1993) have measured the monthly stock returns for the period of 1981-1992 by using CAPM model but they have only measured the stock prices in overall market and point out that values of beta coefficients are near to one indicating that same risk within industries and across the industries. The study has also inferred that Pakistan's financial market is efficient as short run and long run expected returns equal to each other.

Ahmed and Rosser (1995) using VAR technique have measured the non-speculative activities of Pakistan stock market. Ahmad and Zaman (1999) have examined the relationship between volatility and stock returns in Karachi stock market using CAPM model. Ahmad and Zaman (1999,2000) are the first who have studied the whole relationship of risk, return and uncertainty for Karachi stock market from 1992 to1997 using CAPM model and measure the risk premium on asset with beta parameter and infer that Karachi stock market is efficient. Nishat and Mustafa (2010) have measured the relationship between the risk, return and trading volume using GARCH-M model and reveal that there is a significant effect on prices, return and trading activity. Hamid (2015) has investigated the relationship between risk and return in Pakistan stock market using CAPM, DR-CAPM and GMM model and point out that there is a high volatility in Pakistan stock market. Khan (2016) using ARCH, GARCH, and EWMA model has computed the daily, weekly and monthly volatility on stocks and returns. Khan and Hijazi (2019) using OLS model have examined the effects of stock on future trading and volatility.

All these studies exhibit that the various researchers have used diverse methods to measure the risk, return of stocks in Karachi Stock Market of Pakistan.

This study is based on the estimation of risk premium, uncertainty and risk on asset, return on asset, shocks and volatility from the various sectors and in overall market by using CAPM model. The main objective of this study is to measure the effectiveness of returns and risk of stock by including anticipated and unanticipated factors of risk and uncertainty. It is important for every country that its financial market should be efficient, so we have measured the efficiency of Pakistan Stock Market. Moreover, we have also observed the magnitude of beta in a specific sector to examine the risk factor along with the calculation of the movement of trends in various sectors. The specific objectives of the study are:

- To compute the appropriate integrated Moving average processes of different orders for various sectors.
- To estimate the standard deviation on monthly returns by sub-dividing the monthly returns into anticipated and unanticipated factors for the estimation of volatility shocks and uncertainty.
- To analyze the relationship between risk and returns on individual sectors and whole market.
- To measure the flow of trends and market efficiency between returns on individual sectors and whole market and analyze the direction of their movement.
- To calculate the volatility between sectors and the whole market.

The structure of this study is organized as: Review of assorted studies is given in section 2. Section 3 elaborates the theoretical framework in the form of Capital Asset Pricing Model. Section 4 contain the data and methodology while section 5 gives the estimation of results and discussions. Section 6 concludes the study along with policy implications.

2. Review of Assorted Studies

This section consists of the summary of empirical studies based on uncertainty, risk and return. Table 1 displays the synopsis of studies based on Pakistan and other countries' stock exchange market, studies based on volatility and non-volatility stock market, studies based on equity, bonds and share prices and studies based on risk and return of stock market.

Table 1: Summary of Studies

Reference(s)	Country	Time covered	Period	Methodology	Main results
Studies based on Pakistan and other countries Stock Exchange Market					
Abounoori and Tour (2019)	Iran, USA, Turkey, and UAE	2008 to 2017		ARCH and GARCH model	The shock and volatility effects were positive in stock market.

Gourene, Mendy and Ake (2018)	Emerging markets (Brazil, Russia, India and China) and developed markets (US, UK, France, Germany and Japan)	2005 to 2018	MODWT (Maximum Overlap Discrete Wavelet Transform model)	Correlation of return and oil price was inverse.
Javaira and Hassan (2015)	Pakistan	2002 to 2007	CSSD	Stock prices were positively interrelated with both equity return dispersion and asymmetric behavior.
Raza, Jawaaid, Afshan, Karim (2015)	Pakistan	1976 to 2011	ARDL	The relation between stock market capitalization and foreign capital inflows, workers remittances, economic growth was positive both in long and short run.
Sharif (2015)	Pakistan	1 July 2008 to 31 January 2009	AR and CAR model	Negative effects arise when price floor was imposed in the market.
Rahman and Mohsin (2012)	Pakistan	1999 to 2007	Weighted and Decile technique	Zero cost momentum effect was very positive for long term in the stock market.
Javed and Ahmad (2011)	Pakistan	1993 to 2007	EGARCH model and FAMA FRECNH three factors model	Beta was positively related with return at high market while the relation between Beta and return on low market was inverse.
Sohail and Hussain (2009)	Pakistan	2002 to 2008	VECM method	Stock returns influence negatively in consumer sector while relationship of stock return with real effective exchange rate and money supply was positive in industrial sector.
Zou and Adam (2008)	China	1996 to 2000	OLS model	Volatility was inversely related with stock returns.
Moore (2007)	Hungary, Poland and UK	1999-2005	GARCH	Interrelation at exchange rate and Hungary return was positive while exchange rate was negatively correlated with Poland return.
Akmal (2007)	Pakistan	1971 to 2006	ARDL and	There was a

			cointegration model	negative relation between inflation and stock prices.
Robinson (2005)	Jamaica	2 January 1992 to 31 December 2001	Autocorrelation test and run test	Stock prices positively influenced in Jamaica stock returns.
Khan (2004)	Pakistan	1980 to 1999	Cointegration method	The relation between stock prices and inflation was positive.
Farooq and Keung (2004)	Pakistan	1994 to 2003	Granger test and cointegration method	The relation between stock prices and exchange rate in long run was negative while the relation between stock prices and exchange rate in short run was positive.
Hussain and Muhammad (2001)	Pakistan	1960 to 1999	Cointegration and error correction model	Stock prices were positively related with both consumption expenditures and investment spending.
Dockery ,Vergari and Vergari (2001)	Greek	1988 to 1994	Variance Ratio test and Robinson's LM test.	Stock prices of individual sector were inversely related with stock prices of overall market.
Atindéhou and Gueyie(2001)	Canadian chartered banks	1988 to 1995	Three-factor model	There was positive relationship between returns and market indices while negatively relationship among returns and interest rate. Exchange rate was depreciated with negative reactions of investors.
Hussain and Upal (1998)	Pakistan	1, January 1989 to 30, Dec 1993	Fama French model and JB Test	Market stock return was inversely reacted with prices of stocks and bonds
Aggarwal (1979)	US	1964 to 1974	CAPM model	Company share prices, US stock market and risk had negative bonding.
Studies Based on Volatility and Non-Volatility Stock Market				
Khan and Hijazi (2019)	Pakistan	1999 to 2008	OLS	Volatility had positively related with stock prices.
Tissaoui and Azibi (2018)	Saudi stock market	8 January 2008 to 31 October	GARCH model (1,1)	Risky assets were negatively interrelated on

					Saudi stock returns.
Prasad et al. (2018)	Australia, Canada, France, Germany, Hong Kong, India, Japan, Korea, Mexico, Spain, Switzerland, Taiwan, UK and USA	Brazil, China, Hong Kong, India, Japan, Mexico, Switzerland, UK and USA	January 6, 2000 to June 13, 2014	GARCH model	In American and European stock market, volatility effect was very high and positive
Lyocsal et al. (2018)	U.S, Canada, Japan, U. K., Germany, France, Italy and Eurozone		2006 to 2016	GARCH model	There was negative relationship between interest rate and return on stock while there was positive relationship between return on stock and volatility prices.
Khan (2016)	Pakistan		1991 to 2013	ARCH, GARCH and EWMA	There was a high volatility in Pakistan stock market.
Singhania and Prakash (2014)	SAARC (Pakistan, Bangladesh and Srilanka)	nations (India, and Srilanka)	2000 to 2011	GARCH model	Stock return were positively linked with both conditionally and unconditionally volatility.
Messis and Zapranis (2014)	Athens Market	Stock	1995 to 2010	CAPM	Responses of stock prices and volatility moved in the same direction.
Fu et al. (2011)	Japanese Foreign market	and stock	1994 to 2007	GARCH model	Volatility transmission was positively related in Japanese stock market and foreign stock market while there was negative relation between volatility transmission and asymmetric effects.
Ahmad and Zaman (1999)	Pakistan		1992 to 1997	Capital Pricing (CAPM) Asset Model	There was a positive relationship between risk and return in stock prices. There was a negative relationship between less risky assets and rate of returns.
Ahmed and Rosser (1995)	Pakistan		1987 to 1993	VAR technique and Hamilton switching model	Positive link in stock prices and exchange rate
Studies based on Equity, Bonds and Share					
Shahzad et al. (2017)	Developed markets (USA, UK, Japan, Canada, and		2009	QQ (Quintile-on-Quintile)	There was positive link at stock bond and stock market.

		Germany. Eurozone countries (Greece, Ireland, Portugal, Spain and Ireland)			
Demirovic et al. (2017)	US stock market	1996 to 2011	GARCH (1,1)		The average correlation between bond and equity was positive. There was negative equity volatility between bonds and equity and negative relation between credit risk and two securities.
Haesen et al. (2017)	US market	1994 to 2013	Three factors (Fama French) model		There was a negative relation between equity return and default risk in a traditional momentum spillover.
Lin et al. (2017)	USA	1998 to 2014	Wavelet method	Analysis	Negative effects were measured at stock return and stock and bond in long term when there were crises in economy.
Ghauri (2014)	Pakistan	2008 to 2011	OLS		There was a positive relationship between size and share prices while share prices have a negative relationship with other variables.
Simlai (2009)	America	1926 to 2007	Fama French Model		There was a positive relationship between volatility and stock return.
Garlappi et al. (2008)	USA	1969 to 2003	Expected Default Frequencies (EDF)		Stock return was negatively affected default probability in the price of stocks and shares.
Hussain and Qasim (1997)	Pakistan	1960 to 1990	OLS		There was positive relationship in 1960, negative relationship in 1970s and positive relationship in 1990s.
Studies based on Risk and Return on Stock Prices					
Chiang (2019)	Canada, France, Germany, Italy, Japan, the UK and USA	1998 to 2016	CAPM (Capital Asset Pricing model)		Conditional volatility and risk were positively interrelated.
Bagirov and	European stock	3 January 2006 to	Using VAR (vector		There was a positive

Mateus (2019)	market	29 December 2015	auto regressive model), VAR-GARCH model, and GMM model.	relation between change in oil prices and list of financial firms while there was a negative relation between change in crude oil prices and financial performance of unlisted firms.
Maghyereh and Al-Zoubi (2018)	Gulf states (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates)	1998 to 2005	EVT-based model and POT method.	Return of stock and risk were connected positively.
Kumar (2018)	Emerging stock market	2000 to 2014	Threshold-GARCH(1,1) model	There was a negative relationship between stock return and expected volatility during the post-crash periods. There was a positive relationship between stock return and unexpected volatility.
Loudon (2017)	Canada, France, Germany, Italy, Japan, the United Kingdom and the United states.	January 1973 to December 2013	GARCH M and Markov switching regime model.	Negative correlation was found at stock return and risk while stock return had positive outcomes with uncertainty of price level.
Lee (2017)	Australia	2 March 2011 to 18 May 2016	C-GARCH-M (component-GARCH-Mean) model.	Return and risk were positively related.
Hamid (2015)	Pakistan	2000 to 2012	GMM (Generalized method of momentum) and GLS (Generalized least square) methods	There was a negative relation between Return and risk.
Mustafa and Nishat (2010)	Emerging market	1991 to 2010	GARCH	Return had positive linked with trading volume
Hyde (2007)	France, Germany, Italy and the UK	January 1973 to June 2004		Stock returns were positively related with both and exchange rate and risk in four countries.
Khiliji and Nabi (1993)	Pakistan	July 1981 to June 1992	CAPM	Risk and return were positively related.

3. Theoretical Framework: Capital Asset Pricing Model

CAPM model defines the relationship between risk and returns. Risk is measured by standard deviation

or variance of return while the excess return of monthly period represents risk premium which is formulated by taking difference of return of asset in which risk is present and risk-free asset in the same period. A simple form of CAPM can be written by following French et al. (1987) and Ahmad and Zaman (2000) as:

$$E[(RET_{Rt} - RET_{Rft})\partial_R] = \lambda_R + \beta_R(\partial_R)^k + \mu_t, \quad k=1,2 \quad (1)$$

Risky asset return is represented by RET_{Rt} while risk free asset is shown by RET_{Rft} , ∂_R is variance of return on asset R, prediction operator is E, λ_R and β_R are parameters and μ_t is error term. As for as $k=1$ and 2 are standard deviation or variance which means that excess covering time period of return linked with them.

- If $\lambda_R = \beta_R = 0$, it means that zero expected risk premium while degree of volatility is high or low.
- If $\lambda_R \neq 0$ but $\beta_R = 0$, this situation refers that the returns on risk free asset is different from the return on risky asset and the difference is due to other factors¹ and it is not due to volatility.
- If $\beta_R \neq 0$ and $\lambda_R = 0$, it means that volatility is related with the excess monthly returns.
- If $\beta_R > 0$, the excess returns exhibit the risk premium while if $\beta_R < 0$, volatility of returns on any asset is considered as incentive.

From the Equation 1, we replace standard deviation ∂_R by sample estimate S_R which is:

$$R_{\square\square\square\square} - \square\square\square\square = \square\square + \square\square(\square\square\square)^{\square} + \square\square$$

(2)

We follow again French et al. (1987) and Ahmad and Zaman (2000) to calculate monthly standard deviation:

$$S_{Rt} = \left[\sum_{j=1}^{K_t} (r_{tj})^2 \right]^{1/2} \quad (3)$$

In Equation (3) the monthly t trading term is presented by K_t which is the number of days and the term return is showed by $\square\square\square$ on day j of month t. To calculate the daily variation in a month, we are aggregating variation of whole month which is not divisible with trade of daily data. Return of day to day is measured by serial correlation despite the use of formula of standard deviation presented by economists French et al, (1987) and Ahmad and Zaman (2000) that is shown in equation (4):

$$S_{Rt} = \left[\sum_{j=1}^{K_t} (r_{tj})^2 + 2 \sum_{j=1}^{K_t} r_{tj} r_{t,j-1} \right]^{1/2} \quad (4)$$

We are using formulas in equation (3) and (4) for measuring difference from mean, but results show that these formulas are not sufficient for measuring difference. If the results from Equation (4) are negative, we use Equation (3) instead of Equation (4).

Now we subdivide the standard deviation into anticipated standard deviation and anticipated error using ARIMA models. Risk is measured by anticipated standard deviation and uncertainty is measured by anticipated error of standard deviation, but it is unable to measure the volatility. (Chen et al., 1986 and French et al., 1987, Ahmad and Zaman (2000)).

In Equation (5), by measuring the autocorrelation of four variables, we use variance instead of standard deviation of four variables. The autocorrelation coefficient of all the sectors of the first difference of standard deviation are eliminated by using four-month lag which are shown in Table 2 with moving average model.

$$[(1 - \square\square)]\square\square\square = \square\square\square + \left[\sum_{\square=1}^{\square} \square\square\square(\square\square\square) \right] \square\square \quad (5)$$

In Equation (5) LG is used for lag and k represents the number of differences taking in the moving average formula. By getting the anticipated standard deviation of first difference, from the calculated

¹ i) disparity in transaction costs ii) premium on term structure of the risky and risk-free assets

equation (5) we subtract the errors that is $\square_{\square}$, from previous measured values.

$$[(1 - LG)S_{Rt}]^A = (1 - LG)S_{Rt} - er_t, \quad (6)$$

Following Equation (6) the A is the anticipated value and t is time period, by assuming we equal the first period of anticipated standard deviation with its original value $\square_0$ by converting the first differences into level and A is anticipated value that is presented in Equation (7):

$$(S_{Rt})^A = S_0 + \sum_{j=1}^m [(1 - LG)S_{Rj}]^A \quad (7)$$

In Equation (7), $\square_0$ is the original value of standard deviation of the first month on the other hand $j=1,2,\dots$. In the end, our anticipation error is

$$AE_{Rt} = S_{Rt} - (S_{Rt})^A \quad (8)$$

Now we are interpreting the Equation (9), (10), (11) and (12) with the help of these equations we interpret the results of monthly returns of anticipated and unanticipated volatility shocks on asset which is explained in Equation (9), volatility, shocks and risk between sectors and overall market which are explained in Equation (10), returns on monthly in sectors and overall market are elucidated in Equation (11) and finally we explain the volatility relationship between particular stock return and whole market return which are described in Equation (12). In all these equations, we used CAPM.

Firstly, we are explaining the Equation (9) in which independent variable is $RET_{Rt} - \square_{\square}$ which is difference between return on risky asset with return on risk free asset, while dependent variable is $\square_{\square}$ which is anticipated standard deviation of return, $\square_{\square}$ defines anticipated error prediction in standard deviation of return, $\square_{\square}$ is error term. Equation (9) is interpreted the risk premium, volatility, shocks and their results are shown in Table 2 and we also expected that the magnitude of parameter $\square_{\square}$ and $\square_{\square}$ are positive.

$$RET_{Rt} - RET_{RFt} = \lambda_R + \beta_R (S_{Rt})^A + \eta_R AE_{Rt} + \varepsilon_t, \quad A=\text{anticipated} \quad (9)$$

Next we are explaining the Equation (10) in which we are calculating the volatility of monthly return relationship between sectoral returns with whole market returns.

$$RET_{Rt} - RET_{RFt} = \lambda_R + b_R (S_{0t})^A + c_R AE_{0t} + \varepsilon_t, \quad (10)$$

Equation (10) the variables $\square_{0\square}$ and $A\square_{0\square}$ determines the anticipated standard deviation and the anticipation error in standard deviation. In Eq (10) the parameters $\square_{\square}$, $\square_{\square}$ and $\square_{\square}$ their signs are not mentioned. The magnitude of parameter $\square_{\square}$ indicates the strength of risk in a market asset. If $\square_{\square} > 0$ it means that there is proportionally increased in the return on asset R when the risk of whole market increases. Another way when $\square_{\square} < 0$ indicates that in high market volatility the return on asset R is not much attractive for the investors. While when $\square_{\square} = 0$ implies that return on asset R is free from the whole market volatility which is expected.

As for as we find out the relationship of ups and downs of return between specific sector and the whole market. For this aspect we are using the Equation (11) which interpret our results.

$$RET_{Rt} - RET_{RFt} = \delta_R + \theta_R (RET_{0t} - RET_{Ft}) + \varepsilon_t, \quad (11)$$

Finally, we are discussing the relationship of volatility between specific assets of return with whole market return. We may analyze this relationship with the help of Equation (12).

$$S_{Rt} = \gamma_R + \gamma_{RV} S_{0t} + \varepsilon_t, \quad V=1=\text{volatility} \quad (12)$$

Now after stating the CAMP model, we turn our attention towards empirical results.

4. Data and Methodology

In this study, we have used the data of 10 sectors of Pakistan Stock Market. General indices and all the sectors indices are included, and their data are collected on daily and monthly basis during 2006 to 2014 from SBP. With the relative change of stock price indices, the rate of return on daily and monthly basis are calculated as month to month and day to day. Treasury bill rate is used as risk free interest rate because treasury bills maturity period is short, and rate of returns are fixed for the given period.

5. Results and Discussions

For interpretation of returns of variance for stochastic processes, for the level and the first difference of the variance besides the log of variance, we worked out up to 12th -order sample autocorrelation coefficients. Standard deviation is also calculated with same process. Results concluded that except first difference of standard deviation, using four months lag the coefficients of autocorrelation declines. While the autocorrelation coefficients are not linked up for other conditions. After these results, there is need of integrated moving average technique for the standard deviation series.

By using equation 5, the results of Table 2 are based on the correlograms and experiments, we analyze the integrated moving average of different orders for various sectors. The results of Table 2 indicate that there is significance on the most of parameters of MA technique. The value of t-statistics of all sectors are greater than unity which means that the specifications of MA process cannot be further curtailed with adjusted R^2 . After these estimates, we have further divided the anticipated standard deviations of return and the anticipation error using equation (6), (7) and (8). These computed equations are further used for the estimation of different CAPM models. Equation (9) indicates the outcomes of CAPM model which are further discussed in Table 2. The results show that the magnitude of beta related with all sectors also with the anticipated standard deviation along with the anticipation error are positive and utmost sectors are statistically significant which means that there is a risk premium in the monthly excess return, when risk is high then anticipated return also high and the volatility is also anticipated high. Thus, there is a bad shock for investors but the reward for taking risk is risk premium that compensate all uncertainty. Furthermore, when the volatility reduces that is not foreseen in this respect, risk premium compensates all the risk.

The overall results show that in the market there is risk premium in the excess market return. High risk premium is anticipated in the sectors of Transport and Communication, Cotton and other Textiles, Engineering, Paper and Allied suggesting that the investors take more amount of risk which is greater than the actual amount of risk in these sectors. So in these sectors, the investors are risk lovers. Low risk premium is anticipated in the sectors of Cement, Cable and Electric Goods, Auto and Allied, Sugar suggesting that investors are risk averse and they do not want to take any amount of risk in these sectors. Additionally, the sectors in which the reward for risk is high when there is high volatility which is unanticipated as well as that sector volatility become low which is not expected and in that sector the reward for risk is also low. (Ahmad and Zaman, 2000).

Table 2: Integrated Moving Average (MA) Models for Selected Sectors

Dependent Variable: d(SD of Returns)								
Sectors	Φ_{R0}	Φ_{R1}	Φ_{R2}	Φ_{R3}	Φ_{R4}	Prob. (F-Stat)	R2	DW
Transport & Communication	-0.1825	-0.4814**	-0.786**	----	----	0.0000	0.4304	1.9571
Fuel and Energy	-0.4088	-0.929***	-0.690***	0.1354**	-0.8592*	0.0001	0.5812	2.1683
Cotton & Other Textiles	0.6652	-0.685***	-0.038**	-0.989***	----	0.0000	0.5484	2.0417
Sugar	0.1385	-0.7426**	-0.3406*	0.9223*	----	0.0000	0.3206	2.1864
Cement	-0.5219	-0.9530*	----	----	----	0.0005	0.2338	1.9994
Engineering	-0.6425	-0.3302*	----	----	----	0.0000	0.3165	2.1150
Cable & Electric Goods	0.4857	-0.0603**	-0.5142*	0.5075*	-0.900**	0.0000	0.4801	2.1286
Paper & Allied	0.6742	-0.829***	----	----	----	0.0000	0.3579	1.8606
Auto & Allied	-0.2014	-0.3183**	----	----	----	0.0080	0.2207	2.1321
Chemicals & Pharmaceuticals	-0.4623	-0.1270*	----	----	----	0.0300	0.3679	2.1756
Overall Market Index	-0.6876	-0.0373*	-0.2406*	----	----	0.0000	0.4834	2.0605

* ** *** are 1%, 5% and 10%.

Table 3 exhibits that the magnitude of lambda is positive in the cement sector, Cable & Electric Goods and auto and allied sector implying that there is a no risk in the excess monthly return, when there is any risk anticipated then the return on excess market will be negative. As treasury bills maturity period is long-lasting in contrast with assets of stock market which are exchangeable with any time so above results are forecasted. Accordingly, treasury bill can be the reward of taking risk in the excess monthly return because these treasury bills compensate all loss when the investor takes the risk (Ahmad and Zaman, 2000).

Table 3: Anticipated Volatility (Risk) and Unanticipated Volatility Shocks (Uncertainty) of Excess Monthly Returns

Dependent Variable: (RET _{Rt} - RET _{Rft})						
Sectors	λ_R	β_R	η_R	Prob. (F-Stat)	R2	DW
Transport & Communication	-0.5189*	0.2274	0.5642***	0.0045	0.1881	2.35
Fuel and Energy	-0.6517**	0.1225*	0.3106**	0.0033	0.1140	2.03
Cotton & Other Textiles	-0.4929*	0.2225*	0.8414**	0.0100	0.4219	2.06
Sugar	-0.3309*	0.1803**	0.0199	0.0000	0.1540	1.94
Cement	0.4564*	0.8079***	0.7386*	0.0398	0.3639	1.88
Engineering	-0.1747	0.7815*	0.7877**	0.0000	0.1677	1.99
Cable & Electric Goods	0.6032	0.4317***	0.7224*	0.0024	0.4756	1.97
Paper & Allied	-0.6707*	0.8783**	0.3750*	0.0005	0.4966	1.87
Auto & Allied	0.5917	0.2113*	0.4424**	0.0001	0.2820	1.94
Chemicals & Pharmaceuticals	-0.1643**	0.4586***	0.0521*	0.0000	0.2642	1.88
Overall Index	-0.4740**	0.4777**	0.2666**	0.0000	0.1402	2.17

* ** *** are 1%, 5% and 10%.

Next, we are interpreting the relationship between the excess monthly return of individual sector and its effects on overall market. To explain how the whole market earns profit or return with the profit of separate sector of the market, we have used equation 10 and its results are shown in Table 4. In Table 4, $\lambda_{\square}$ is risk $\square_{\square}$ is anticipated SD of return on general index and $\square_{\square}$ is anticipated error in SD of return on general index. Table 4 interprets the results of standard deviation of return on general index and anticipated error in standard deviation on general index.

The results show that in all sectors except two sectors the value of lambda is negative and the value of $\square_{\square}$ and $\square_{\square}$ are positive which means that the excess monthly return contains risk premium in the overall market. The value of $\square_{\square}$ which is error prediction in the standard deviation of returns is positive means that the investors are risk lovers and they compensate their uncertainty risk with the reward of risk premium. On the other hand, cement sector and Chemicals and Pharmaceuticals sector their magnitude of lambda is positive. The results show that the value $\square_{\square}$ is positive which means that there is no risk in the excess monthly return of asset of the individual sector. The results show that the volatility and the uncertainty in the overall market is not significant influencing on the rates of return on asset of individual sectors (Zou and Adam, 2008; Ahmad and Zaman, 2000).

Table 4: Anticipated Volatility (Risk) and Unanticipated Volatility Shocks (Uncertainty) of Sectoral Excess Monthly Returns in Overall Market

Dependent Variable: (RET _{Rt} - RET _{Rft})						
Sectors	λ_R	b_R	c_R	Prob. (F-Stat)	R2	DW
Transport & Communication	-0.1331**	0.5630*	0.7867**	0.0115	0.1444	1.67
Fuel and Energy	-0.6333**	0.6583*	0.3508***	0.0430	0.3579	1.45

Cotton & Other Textiles	-0.7080	0.6370*	0.4000**	0.0826	0.2777	1.35
Sugar	-0.3074	0.7883	0.2103*	0.0194	0.2354	1.94
Cement	0.9644**	0.7920***	0.4960	0.0057	0.0096	1.51
Engineering	-0.6935*	0.7781**	0.4755*	0.0971	0.1770	1.78
Cable & Electric Goods	-0.293***	0.0258*	0.7940**	0.0195	0.1533	1.41
Paper & Allied	-0.1489*	0.7236	0.0993**	0.0858	0.2739	1.97
Auto & Allied	-0.327***	0.5859*	0.9656*	0.0455	0.2152	1.88
Chemicals & Pharmaceuticals	0.5400**	0.8959	0.0578**	0.0752	0.2837	1.66

* ** *** are 1%, 5% and 10%.

The results show that the investors in the individual sector are willing to receive the high risk with the high increased anticipated volatility in the overall market. The unanticipated volatility shock in the overall market exists when the uncertainty of return increases in these sectors. Furthermore, the demand of asset of a particular sector declines up to the reward of risk premium to compensate the all-risk that is increased. Similarly, it is expected that when the particular sector is received high return that is not certain, it results in high volatility shock that is not anticipated in the overall stock market (Zou and Adam 2008; Ahmad and Zaman, 2000).

Now we are discussing the effects of returns on asset in both individual sector and overall market return. Furthermore, we are examining the relationship between individual returns and overall market return on monthly bases. All these results are present in Table 5 by using equation 11.

Table 5: Sectorial Excess Monthly Returns and Returns with Overall Market Index

Dependent Variable: (RET_{Rt} - RET_{Rft})					
Sectors	δ_R	θ_R	Prob. (F-Stat)	R²	DW
Transport & Communication	-0.5739**	0.9588***	0.7657	0.55	2.10
Fuel and Energy	0.6292*	0.3539**	0.1478	0.84	2.11
Cotton & Other Textiles	0.0915*	0.6382	0.6015	0.79	2.24
Sugar	-0.9896*	0.3709**	0.8944	0.82	2.47
Cement	-0.591***	0.8182*	0.6597	0.68	2.15
Engineering	-0.1923	0.7748**	0.6692	0.62	1.93
Cable & Electric Goods	-0.6368*	0.0946*	0.3756	0.52	1.65
Paper & Allied	-0.0030**	0.4456*	0.2145	0.86	2.59
Auto & Allied	-0.3027*	0.0381	0.6439	0.83	1.69
Chemicals & Pharmaceuticals	-0.7433*	0.3854**	0.7383	0.59	2.16

* ** *** are 1%, 5% and 10%.

In Table 5, we examine the relationship between returns of individual sector and overall market and results show that in all sectors the relationship between the returns of individual sector with the returns of overall market are positive and significant. The rate of return of overall market positively rises and falls with the rise and fall of returns of individual sector. On contrary, it is noted that how the market trends efficiently work with daily variations or monthly variations while studies examine that market trend is not work efficiently with daily variations of stock returns but during the period of one month stock of returns of sectors follow the market trend. Results point out that there is a competitive trading activity in a Pakistan Stock Market (Ahmad and Zaman, 2000; Lyocsal et al. 2018).

Finally, Table 6 discusses the volatility effect in the sectorial and overall market. The results exhibit that there is positive relationship between the standard deviation of monthly excess returns of individual sectors and overall market. The values of $\sigma_{\square}$ and $\sigma_{\square\square}$ are positive in mostly sectors except two sectors in which the value of $\sigma_{\square}$ (standard deviation of monthly excess returns of individual sector) is negative and these sectors are Fuel and Energy, and Cable and Electric Goods. But the overall average of these

sectors is positive which indicates that the individual sectors of excess returns of standard deviation is positively related with the overall market of excess returns of standard deviation. It means that the volatility of individual sector complies with market trend suggesting that there is speculation when there is volatility in the stock market (Khan, 2016).

Table 6: Returns on Sectorial and Overall Market Volatility

Dependent Variable: (SD of Excess Returns)					
Sectors	γ_R	γ_{RV}	Prob. (F-Stat)	R2	DW
Transport & Communication	0.3085 ^{**}	0.5290 [*]	0.9878	0.18	1.77
Fuel and Energy	-0.4642 [*]	0.0482 ^{***}	0.0483	0.47	1.69
Cotton & Other Textiles	0.4850 ^{**}	0.9710	0.8748	0.13	1.96
Sugar	0.2686 [*]	0.6772 [*]	0.2953	0.19	1.84
Cement	0.7272 ^{**}	0.7566 ^{***}	0.2076	0.39	1.48
Engineering	0.6516 ^{**}	0.5583 [*]	0.2514	0.68	1.64
Cable & Electric Goods	-0.036 ^{***}	0.6311 [*]	0.5085	0.41	1.90
Paper & Allied	0.0136 [*]	0.1804 ^{**}	0.7472	0.35	1.87
Auto & Allied	0.2645 ^{**}	0.1838 ^{***}	0.0706	0.26	1.79
Chemicals & Pharmaceuticals	0.9471 ^{**}	0.1631 [*]	0.1701	0.33	1.43

* ** *** are 1%, 5% and 10%.

The result exhibit that market trend is followed by sectorial returns implying that Pakistan Stock Market is significantly influenced in the presence of trading decision and financial market is influenced by external shocks in which whole market is affected symmetrically suggesting that when shocks exist in the asset, these shocks badly affect the whole market returns. In a nutshell, the results conclude that there are no asymmetric information in the market.

6. Conclusions and Policy Recommendations

In this study, we have examined the link among excess monthly returns, uncertainty and risk factors by using Capital Asset Pricing Model (CAPM) model for 10 sectors of Pakistan Stock Market. We have used monthly data over the period of 2005 to 2016. We have examined the dependence of level of sector volatility on individual sectors and overall stock market. The analysis shows that the level of volatility of particular sector depends on the excess monthly returns of each sector and overall stock market volatility. Furthermore, there is risk premium in the individual sector returns which causes the anticipated risk in the discrete sector and overall stock market. Moreover, the unanticipated volatility shocks overhaul with the rates of returns when sectors received in individual sector and overall stock market. The discrete sectors and overall stock market follow same oscillating trends in the long run suggesting that rate of returns in various sector have reacted same way with the overall stock market performance. Moreover, the volatility factor is also included in discrete sectors and these sectors also go with the same trend of market. The broad conclusion of the study is that volatility factor is high in the overall stock market and the level of volatility in different sectors of the market moves in the same direction which suggest that speculative activities are widely spread in every sector and in overall market as well.

Prudent decisions can be made by observing the fact that most of the investors are risk averse due to their behavior and presence of risk premium and the compensation of unanticipated shocks in Pakistan Stock Market. Additionally, same oscillating trends indicate that there is high competition in Pakistan Stock Market and trading activities are based on the strengths and weakness of investors. In summary, we may conclude that Pakistan stock market is a volatile and vigorous market and it follows the bandwagon effect.

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