ASYMMETRIC VOLATILITY, RISK AND RETURN TRADEOFF IN ASIAN PACIFIC STOCK MARKETS

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ABSTRACT

In this study we examined the asymmetric volatility, leverage effect hypothesis, disposition effect and the existence of positive risk, return tradeoff in the Asian Pacific Stock markets consisting of Australia, China, Hong Kong, India, Indonesia, Japan, Korea Malaysia Pakistan and Taiwan. This study constituted of the daily return data of stock indices for all the countries for the period of five years from December 2007 to December 2012. We deduced significant results supporting the existence of asymmetric effect in all Asian pacific stock exchanges. Our results conclude that among Australia, Hong Kong, Japan, Korea, Taiwan, India and Pakistan there is no evidence of positive risk and return tradeoff hence there is strong evidence of disposition effect and loss aversion bias. Where in case of china, Malaysia and Indonesia the positive risk and return trade is expected to be less influenced by loss aversion and disposition effect. The results of asymmetric volatility confirm the existence of leverage effect in all Asian pacific Stock Exchanges hence confirm the disposition effect.

Key Words: *Asymmetric Volatility, Asia Pacific, Leverage Effect, Risk and Return, and Loss Aversion Bias.*

1-INTRODUCTION

The relationship between stock price and financial instability has long interested researchers. Empirically, the conditional variance of returns and next time period returns are negatively correlated. That is, a negative (positive) return is usually related with the movement up or downward direction of the volatility. The movement variability is often mentioned in the literature as asymmetric volatility mentioned by Engle and Ng (1993), Zakoian (1994), and Wu and Xiao (1999). Risk is related with unwanted outcome, volatility is a measure strictly for uncertainty which could be due to a positive outcome (Poon, 2005). This type of asymmetric behavior is known as the leverage effect hypothesis. Leverage effect hypothesis imply that negative shocks to returns augment financial leverage, which leads the stocks to be riskier and therefore and as a result which drives up the volatility Black, (1976), and Christie, (1982). Equity prices tend to change on daily basis in the market. The fluctuation in the share prices is due to the demand and supply. Basically volatility is an indicator of extremely liquid market. Every assets price is based on its volatility. Investors deduce that an increase in equity market volatility increases the risk in stock investments which leads investor to move their investments to less risky assets. Behavioral finance gives an justification for this asymmetric behavior of volatility. This is due to the impact of the loss aversion bias. Shefrin, and Statman (1985), it encompasses that the investors hold the securities or assets which are subject to loss for a longer period of time in comparison to the assets which give gains. Khanman and taversky (1979) described in prospect theory that an investor becomes risk lover when he goes into loss domain and becomes risk averse when he enters gain domain.

A lot of nonlinear models have been used in finding out the volatility of stock price some of which considered most stable are the ARCH (Auto Regressive Conditional Heteroscedasticity) and GARCH family. Although the ARCH and GARCH models have been very successful in capturing volatility clustering, there are some features of the financial time series data which they failed to capture. It basically gives symmetric response to the positive and negative shocks meaning that the volatility for both shocks is treated as the same in this model which ignores to take into consideration and this model is unable to capture or explain the asymmetry of information or asymmetry of volatility. So this is the main limit of GARCH, that it enforces only symmetric response of volatility towards negative and positive shocks. The most interesting feature not addressed by these models is the asymmetric effects. The most discussed and admired asymmetric effect is the leverage effect. First documented by Black (1976), it entails that a negative shock to the conditional variance tends to cause volatility to rise by more than a positive shock of the same magnitude. It does not treat the positive and negative shocks the same but handles them differently.

In this study, our aim is to model and estimate the daily volatility of stock returns on the Asian Pacific Stock Markets as well, by using symmetric and asymmetric GARCH models that capture asymmetry. This is to provide insight into the response of volatility to negative and positive news as well as extend existing literature on volatility in Pakistan and for foreign stock markets. This paper is structured into four sections. Immediately preceding Introduction in Section 1 is Section 2, which outlines valuable literature in this area. Section 3, will describes the nature of data and methodology. Section 4 will presents the empirical results for Asian Pacific Stock Markets, and Section 5 Will be concluding remarks regarding the results in section 4.

2-LITERATURE REVIEW

Engle (1982) presented an article regarding the measurement of time varying volatility. The model ARCH (Auto Regressive Conditional Heteroskedasticity) basically presents that the variance of the error terms at a specific time period relies on the squared error terms from the previous periods, which means that it is appropriate to model the mean and variance of a series when we might think that variance is not constant. The idea presented by him was to allow the variance of the residuals depend on past history because the variance does not remain constant over a time period having the quality of hetroskedasticity. The standard time series and econometric models work under the postulation that variance is constant which means the data has homoskedastic quality.

Bollerslev (1986) introduced GARCH model. GARCH model is a generalized form of ARCH as defined by Engle in 1982. As the ARCH model narrates variance as being dependent on the previous values of squared shocks and ARCH model can break its non-negative constraints. Moreover it entails a greater number of lags to be included in order to catch most of the variations in the variance. The GARCH provides a better fit because it deals in good manner with non-negativity constraints and requires few numbers of lags to be included in the econometric model. Moreover, GARCH model is differentiated from ARCH because it permits the conditional variance to be modeled by previous values of itself in addition to the historic shock. The GARCH model contains an ARCH segment and indicates an element where today's variance can be expressed by previous variances. Asymmetric effects are captured by asymmetric models such as the exponentinal GARCH (EGARCH) of Nelson (1991), the GJR-GARCH model introduced by Glosten, Jagannathan, and Runkle (1993), Asymmetric Power ARCH (APARCH) of Ding, Engle and Granger (1993), and threshold GARCH (GJR-GARCH) model due to Zakoian (1994), and so many other models. Nelson (1991) introduced the Exponential GARCH model. This model is quite purposeful and useful in comparison to the GARCH because it permits good news and bad news to have a different impact on the volatility. Moreover it also permits big news to have higher impact on volatility. Particularly this model works in two stages, Firstly it takes into consideration the mean and secondly the variance component. He also devised a model (EGARCH) to test that the variance of volatility was treated differently in the case of positive and negative shocks not as in the case of (GARCH) which only covers the symmetric response of positive and negative shocks. This also led to the finding that not only was it true, but also that excess returns were negatively associated to equity market variance. Schwert (1989) also signified that the volatility in stocks is at higher levels in markets while recessions or financial crises.

Black (1976) established that returns are negatively correlated with changes in volatility, a judgment which entails that volatility has a tendency to increase when market turn down. This fact has been ascribed to the leverage effect according to which a decrease in equity price generates a high debt to equity ratio and as a result a higher volatility. Nelson (1991) also used the same model by using the CRSP value-weighted market index from 1962-1987 for united states he found out that negative shocks increase the volatility more as compared to the volatility created by positive shocks which led to the finding that that there is no evidence of significant risk and return trade off. French, Schwert and Stambaugh (1987) By using daily data form Standard and Poor's composite portfolio from January 1928 to December 1984 they found expected equity returns and volatility by taking ARIMA and GARCH models to predict volatility. They found that the GARCH model uses the data much appropriately which led them to present the confirmation of a negative association between anticipated returns and unexpected volatility. Pagan and Schwert (1990) also confirmed the findings of nelson (1991) regarding the asymmetric volatility and the model has a much more flexible method of capturing the leverage effect as compared to the predecessor GARCH model. Booth, Hatem, Virtanen, and Y Li-Olli, (1992) found by using raw data of the Finish financial market, Helsinki daily value weighted price index for January 1980 to December 1987 that the GARCH model fits the data accurately explaining the volatility more precisely than any other models. Poon and Taylor (1992) examine the U.K stock by taking the data of returns for daily weekly fortnightly and monthly from January 1965 to December 1989 market. The results signify that the risk and return tradeoff is positive but insignificant. Ogum, Beer and Nouyrigat (2005) reports, amongst others, that volatility clustering and asymmetric volatility found in the United States and other developed markets are also present in Nigeria. They also report positive and significant asymmetric volatility coefficient in Kenya, which suggests that positive shocks increase volatility more than negative shocks of the same magnitude.

Banerjee and Sarkar (2006) found the existence of extended memory in equity returns in the Indian equity market. It was identified that though daily returns are mostly un-correlated, there is good confirmation of extended memory in the conditional variance. They deduced that the the FIGARCH was the most adequate to model the volatility and it surpasses the Garch models. It was deduced that the leverage hypothesis was immaterial for Sensex stock returns and for this reason other models of symmetric volatility had superior results as they anticipated. Hamao and Mei (2001) studied the influence of domestic and foreign trading on the volatility of market for Japan by taking Nikkei 225 for the period of July 1974 - June 1992 there results concluded that no significant evidence was found regarding more increase in market volatility due to foreign trading trends than domestic trading. One of the reasons of this was due to the small amount of FPI in Japan at that time. Mandelbrot (1963) also signified the asymmetric behavior of stock returns that large shocks are followed by large shocks and small shocks are followed by small shocks. Engle (2004) volatility is said to be high when it is high and will be low when it is low. Volatility clustering is only the clustering of information. This characteristic depends on the information that the news is clustered over time. Longmore and Robinson (2004) Volatility is higher after negative shocks than positive shocks of the same magnitude. It was first proposed for equity returns. It was also recognized asymmetry to leverage hypothesis. In this framework, negative shocks increase the volatility of asset markets that are predictable than positive shocks. Another clarification for the asymmetry is the volatility feedback hypothesis. In case of foreign markets, a shock that increases market volatility increases the risk of foreign currency holdings..

Mehrara and Abdoli (2006) studied the Iranian equity market returns market daily data for the period of March 1999 to May 2003 by using the time varying model negating the asymmetric volatility and presence of symmetric response. The reason for such results was the informational inefficiency and the infrastructural limitation of the market. Saeidi and Koohsarian (2010), studied the Iranian stock market by using the Garch models they deduced that there is the presence of asymmetric volatility and leverage effect hypothesis.

3-DATA AND METHODOLOGY

The data used in this study is of ten Asian pacific countries comprising of Japan, Australia, China, India, Hong Kong, Pakistan, Taiwan, Korea, Malaysia and Indonesia using daily stock returns for five years starting from December 2007 to December 2012. This data is obtained from yahoo finance. For each country stock returns will be calculated by using log of returns:

$R_t =$ Ln (P_t / P_{t-1})
Where,
Ln = Natural log
P_t = Closing value of share on Day 't'
P_{t-1} = Closing value of share on Day 't-1'
Where P_t and P_{t-1} are closing prices on Day t and t-1 respectively.

For the analysis of the stock exchange data we have to check its data characteristics to confirm the data is non-linear or linear which leads us to the appropriate method to model the asymmetric volatility for the Asian pacific stock Indices. For this purpose two techniques have been applied.

- BDS Test.
- ARCH-LM Effect Test

BDS test is applied which was devised by Brock, Dechert, and LeBaron, in 1996. The BDS test is conducted to check the non-linearity of data for the ten Asian pacific stock indices. The ARCH effect is applied to check both autocorrelation and hetreoskedasticity problems. However many time series data show hetreoskedasticity where the variance of the error term are not equal and in which the error terms may be expected to be larger for some observations. The details and explanations of the functioning the models which may be used in this study to capture asymmetric effect or leverage effect are as under. The GARCH model contains an ARCH segment and indicates an element where today's variance can be expressed by previous variances. Asymmetric effects are captured by asymmetric models such as the exponential GARCH (EGARCH) of Nelson (1991), the GJR-GARCH model introduced by Glosten, Jagannathan, and Runkle (1993), Asymmetric Power ARCH (APARCH) of Ding, Engle and Granger (1993).

3.1-BDS TEST STATISTICS

The main concept behind the BDS test is the correlation integral, which is a measure of the frequency with which temporal patterns are repeated in the data. Consider a time series x_t *for t = 1, 2…, T* and define its *m*-history as $x_t^m = (x_t, x_{t-1}, \cdots, x_{t-m+1})$. The correlation integral at embedding dimension *m* can be estimated by the following statistical model presented as below:

$$c_{m,\epsilon} = \frac{2}{T_m(T_m - 1)} \sum_{m \le s \le t \le T} \sum I(x_t^m, x_s^m, \epsilon) \qquad (3.1)$$

$T_m = (T - m + 1)$ and $I(x_t^m . x_s^m . \epsilon)$ is an indicator function which is equal to one if $|x_{t-i}, x_{s-i}| < \epsilon$ for *i = 0, 1, · · · , m − 1* and zero otherwise. Intuitively the correlation integral estimates the probability that any two *m*-dimensional points are within a distance of $\epsilon$of each other. That is, it estimates the joint probability:

$$Pr(|x_t - x_s| < \epsilon, |x_{t-1} - x_{s-1}| < \epsilon \ldots, |x_{t-m+1} < x_{s-m+1}| < \epsilon)$$

If *xt* are iid, this probability should be equal to the following in the limiting case:

$$c_{1,\epsilon}^m = Pr(|x_t - x_s| < \epsilon)^m$$

Brock, Dechert, Scheinkman and LeBaron (1996) define the BDS statistic as follows:

$$v_{m,\epsilon} = \sqrt{T} \frac{c_{m,\epsilon} - c_{1,\epsilon}^m}{s_{m,\epsilon}} \qquad (3.2)$$

Where $s_{m,\varepsilon}$ is the standard deviation of $\sqrt{T}\,(c_{m,\varepsilon} - c_{1,\varepsilon}^{m})$ and can be estimated consistently as documented by Brock, Dechert, Scheinkman and LeBaron (1997). Under fairly moderate regularity conditions, the BDS statistic converges in distribution to N (0, 1):

$$v_{m,\varepsilon} \xrightarrow{d} N(0,1) \qquad (3.3)$$

So the null hypothesis of iid is rejected at the 5% significance level whenever

$$|v_{m,\varepsilon}| > 1.96$$

3.2-THE GARCH MODEL

$$\sigma_t^2 = \beta_0 + \sum_{i=1}^{q}\beta_i\,\varepsilon_{t-i}^2 + \sum_{j=1}^{p}\beta_j\,\sigma_{t-j}^2 \qquad (3.4)$$

Whereas (p,q) are order of the GARCH and ARCH term respectively. The variance term σ_t^2 is the conditional variance at time "t" and β_0 indicates constant, whereas $\beta_i$and β_j are the parameters, ε_{t-i}^2 is the indicator of previous squared shocks and σ_{t-j}^2 reflects prior variances. Various studies employed GARCH (1, 1). Brooks (2008) indicates that a GARCH (1, 1), in most cases is enough to grasp the volatility clustering and that higher order is very rare used in the field of finance. Negative variance possibility is very rare; limitations have to be generally specified for these parameters particularly. Therefore GARCH model successfully capture various number of features of financial time series, such as volatility clustering and thick tailed returns.

GARCH model becomes stationary when the total of alpha and beta are less than one ($\alpha + \beta < 1$). On the other hand if $\alpha + \beta = 1$ still the process is stationary because the variance is infinite. The GARCH models applicable in this study will estimate according to maximum likelihood criteria. The ε_t is assumed to b normally distributed approximately with an average value of zero and time-varying variance is expressed in this manner ($\varepsilon_t \sim N(o, \sigma_t^2)$).

3.3-Modified GARCH Model (GJR-GARCH-MEAN)

In the variance equation it accommodates the asymmetric volatility. The previous model GARCH only accommodates the symmetric response to positive and negative shocks

The equation for GJR-GARCH-M is as follows,

$$\sigma_t^2 = \beta_0 + \sum_{i=1}^{q}\beta_i\,\varepsilon_{t-i}^2 + \sum_{j=1}^{p}\beta_j\,\sigma_{t-j}^2 + \sum_{k=1}^{p}\beta_k\left(\varepsilon_{t-i}^2\, I\right) \qquad (3.5)$$

GJR-GARCH introduces dummy variable I this is the portion which captures asymmetric volatility by taking dummy variable I which explains that if ε_{t-i}^2<0 which means that the value is negative I=1, if ε_{t-i}^2> 0 means ε_{t-i}^2 is positive then I=0, this leads to the increase in the volatility due to negative shocks which is the asymmetric treatment, which deduces that this model treats negative and positive shock as two different conditions.

In the mean equation for GJR-GARCH-M is as follows:

$$y_t = \alpha + \beta_0\sqrt{\sigma_t^2} + \beta_i y_{t-1} \qquad (3.6)$$

In this equation y_t **is** the dependant variable α is the constant β_0 is the coefficient of the risk where as $\sqrt{\sigma_t^2}$ is the variance square root standard deviation**.**

Results & Data Analysis

In the below table the standard deviation is 13%, 17%, 19%, 18%, 16%, 18%, 16%, 14%, 13%, and 14% for Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Pakistan and Taiwan respectively which indicates the volatility is high. Form minimum and maximum it could be deduced that the highest return in all countries is 19% and the highest figure for loss is 13%. The data is highly leptokurtic. The kurtosis value in the above table 4.1 and the graph in figure 4.1 are confirming that

Descriptive Statistics	***AUSTRALIA***	***CHINA***	***HONG KONG***	***INDIA***	***INDONESIA***	***JAPAN***	***KOREA***	***MALAYSIA***	***PAKISTAN***	***TAIWAN***
Mean	-0.00028	-0.00068	-0.00019	-0.00002	0.00038	-0.00039	0.00004	0.00014	0.00015	-0.00008
Standard Error	0.00039	0.00050	0.00055	0.00051	0.00047	0.00052	0.00046	0.00040	0.00038	0.00042
Standard Deviation	0.01377	0.01790	0.01971	0.01826	0.01628	0.01824	0.01623	0.01417	0.01335	0.01489
Sample Variance	0.00019	0.00032	0.00039	0.00033	0.00027	0.00033	0.00026	0.00020	0.00018	0.00022
Kurtosis	3.64740	3.39414	7.07974	7.62634	6.97129	8.22111	6.91226	94.36240	3.60060	2.28618
Skewness	-0.36166	-0.16163	0.10700	0.27461	-0.66023	-0.52158	-0.51821	-0.06150	-0.21787	-0.27219
Minimum	-0.08704	-0.08044	-0.13582	-0.11604	-0.10954	-0.12111	-0.11172	-0.19246	-0.05278	-0.06735
Maximum	0.05628	0.09034	0.13407	0.15990	0.07623	0.13235	0.11284	0.19860	0.08255	0.06525
Confidence Level(95.0%)	0.00076	0.00099	0.00109	0.00101	0.00092	0.00102	0.00090	0.00079	0.00074	0.00083

majority of values are lying above the mean and the value for kurtosis is >3 which means the data is leptokurtic, the data is peaked for all most all the Asian pacific countries which is the clear indication of non-linear data. It is essential to check the non-linearity data. The leptokurtic characteristic of the data can also be observed by looking at the graphical representation of the kurtosis figures of all the countries in figure 4.1 which is flat in tail and highly peaked at mean. We have tested the non-linearity via BDS test and Arch Effect, the results are mentioned in table 4.2 and table 4.3 respectively.

Table 4.1 Descriptive Statistics for Asian Pacific Stock Market Returns Indices of Daily Data for the period of 2007-2012

Figure 4.1 Kurtosis for Asian Pacific Countries Stock Market Indices

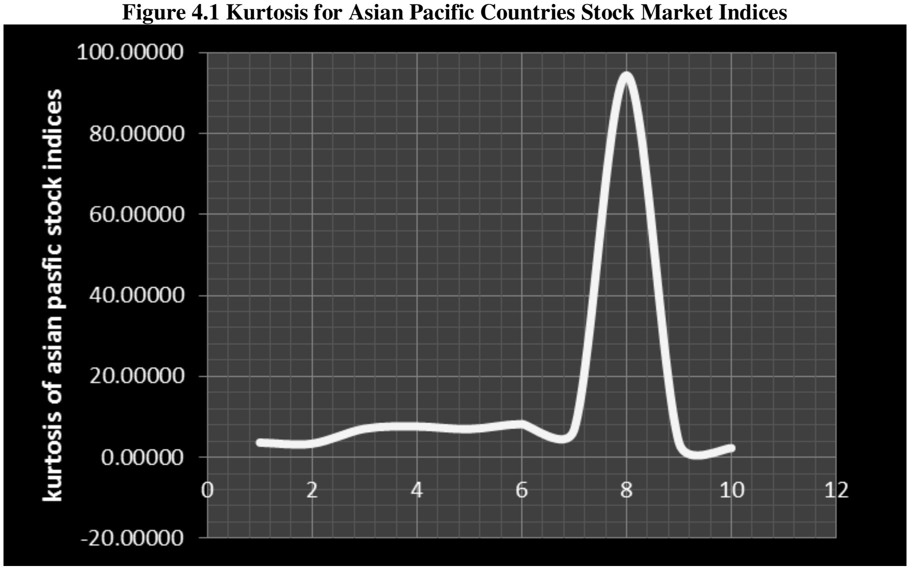

Table 4.2 BDS Test for Asian Pacific Stock Market Returns Indices of Daily Data for the period of 2007-2012

COUNTRIES	*Dimension*	*BDS Statistic*	*Std. Error*	*z-Statistic*	*Prob.*
AUSTRALIA	2	0.017958	0.002496	7.195678	0.0000
	3	0.040332	0.003958	10.18889	0.0000
	4	0.057906	0.004705	12.30798	0.0000
	5	0.069869	0.004895	14.27505	0.0000
	6	0.075983	0.004711	16.12729	0.0000
CHINA	2	0.013108	0.002700	4.854004	0.0000
	3	0.029700	0.004291	6.922333	0.0000
	4	0.045231	0.005109	8.853520	0.0000
	5	0.054392	0.005325	10.21486	0.0000
	6	0.058108	0.005135	11.31504	0.0000
HONG KONG	2	0.018542	0.002597	7.138784	0.0000
	3	0.043517	0.004123	10.55443	0.0000
	4	0.065112	0.004905	13.27473	0.0000
	5	0.080393	0.005108	15.73984	0.0000
	6	0.088278	0.004921	17.93796	0.0000
INDIA	2	0.024357	0.002659	9.159486	0.0000
	3	0.051759	0.004226	12.24634	0.0000
	4	0.073159	0.005034	14.53284	0.0000
	5	0.087955	0.005248	16.75828	0.0000
	6	0.096499	0.005063	19.05892	0.0000
INDONESIA	2	0.024245	0.002852	8.501574	0.0000
	3	0.051010	0.004530	11.26007	0.0000
	4	0.069185	0.005393	12.82767	0.0000
	5	0.080533	0.005621	14.32773	0.0000
	6	0.084704	0.005420	15.62706	0.0000
JAPAN	2	0.019975	0.002500	7.990515	0.0000
	3	0.041304	0.003965	10.41743	0.0000
	4	0.055216	0.004712	11.71766	0.0000
	5	0.063159	0.004902	12.88457	0.0000
	6	0.066894	0.004718	14.17789	0.0000
KOREA	2	0.017512	0.002680	6.534840	0.0000

	3	0.040997	0.004258	9.628723	0.0000
	4	0.058389	0.005070	11.51718	0.0000
	5	0.070867	0.005284	13.41170	0.0000
	6	0.077896	0.005096	15.28579	0.0000
MALAYSIA	2	0.023609	0.002849	8.286761	0.0000
	3	0.053084	0.004524	11.73317	0.0000
	4	0.073930	0.005385	13.72928	0.0000
	5	0.084251	0.005610	15.01707	0.0000
	6	0.088309	0.005409	16.32666	0.0000
PAKISTAN	2	0.041545	0.003126	13.29123	0.0000
	3	0.078994	0.004975	15.87931	0.0000
	4	0.106050	0.005935	17.86913	0.0000
	5	0.120163	0.006198	19.38613	0.0000
	6	0.126452	0.005991	21.10817	0.0000
TAIWAN	2	0.009638	0.002670	3.609649	0.0003
	3	0.027381	0.004235	6.465205	0.0000
	4	0.042477	0.005034	8.437837	0.0000
	5	0.052318	0.005238	9.988329	0.0000
	6	0.059290	0.005043	11.75752	0.0000

The BDS test was devised by Brock, Dechert, and LeBaron, in 1996. The BDS test is conducted to check the non-linearity of data. In the case ten Asian Pacific countries stock exchange indexes the BDS confirms the data is non-linear in nature if look at the above table 4.2, the BDS statistics and respective p-values are highly significant in case of all countries. As the data is non-linear in nature therefore the next step would be the Arch Effect to test.

Table 4.3 ARCH-LM Heteroskedasticity Test Asian Pacific Stock Market Returns Indices of Daily Data for the period of 2007-2012

Heteroskedasticity Test: ARCH	***F-statistic***	***Obs*R-squared***	***Prob. F***
AUSTRALIA	75.79909	71.64252	0.000*
CHINA	36.69086	35.71377	0.000*
HONG KONG	218.7871	186.7999	0.000*
INDIA	16.03432	15.85728	0.000*
INDONESIA	48.31317	46.53214	0.000*
JAPAN	149.449	133.4744	0.000*
KOREA	56.47492	54.11653	0.000*
MALAYSIA	380.5573	291.6603	0.000*
PAKISTAN	182.3909	159.2759	0.000*
TAIWAN	16.72626	16.53119	0.000*

As we have confirmed that the data is non linear by BDS test results we have checked the nonlinearity through ARCH-LM test the results are mentioned in above table 4.2 where the joint significance test statistics (F-Statistics) and Obs*R-squared are highly significant at 95 % confidence level confirming highly significant ARCH effect. We are using GJR-GARCH-MEAN, to check the possible leverage effect and risk return tradeoff.

We use the GJR-GARCH-M as ARCH (1), GARCH(1) and Asymmetric (1) order. The asymmetric term for GJR-GARCH results in below table 4.4 shows that for all countries asymmetric term is highly significant and positive confirming that the leverage effect exists in all Asian Pacific countries. It is the situation where the investors are hoping for the best in times of negative shocks and they stick to their positions which create further illiquidity which incorporates further involvement of disposition effect. On the other side in case of positive shocks the investor are selling the winning stocks which creates liquidity Campbell et al. (1993), Shefrin, and Statman (1985). Such concept is given by the behavioral finance theory called disposition effect. Due to disposition effect the investors are risk lover in loss domain and risk averse in gain domain which is subject to the theory given by Khanman and Taverskey (1979). In this case the negative returns are subject to high negative volatility as compared positive returns which are causing low volatility which is explained by leverage effect. The conditional variance σ_t^2 is dependent on the lagged conditional variance σ_{t-j}^2 as to the coefficient of the of lagged conditional variance is significant having p-value < 0.05 are highly significant for all the Asian pacific countries. The lagged squared residuals are significant for ,China, India, Indonesia, Korea, Malaysia and Pakistan.

Table 4.4 TGRACH-M Variance Equation

GJR-GARCH-M(-1)	*AUSTRALIA*	*CHINA*	*HONG KONG*	*INDIA*	*INDONESIA*	*JAPAN*	*KOREA*	*MALAYSIA*	*PAKISTAN*	*TAIWAN*
β_0	0.000002	0.000002	0.000004	0.000002	0.000004	0.000008	0.000003	0.000045	0.000007	0.000002
	3.5296	3.4474	3.4938	2.9785	5.8008	4.4727	5.6271	6.4483	10.8171	3.5615
	0.0004	0.0006	0.0005	0.0029	0.0000	0.0000	0.0000	0.0000	0.0000	0.0004
β_i	0.0149	0.0288	0.0171	0.0351	0.0492	0.0113	-0.0317	-0.0911	0.0774	0.0039
	0.9422	3.8277	1.1966	4.4250	3.3847	0.7680	-2.8993	-8.3791	4.5520	0.4511
	0.3461	0.0001	0.2315	0.0000	0.0007	0.4425	0.0037	0.0000	0.0000	0.6519
β_j	0.8919	0.9477	0.9081	0.9081	0.8775	0.8666	0.9237	0.7664	0.8041	0.9292
	59.31	131.61	67.23	81.45	70.80	47.91	0.01	20.88	47.73	98.91
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
β_k	0.1598	0.0285	0.1227	0.1070	0.1082	0.1767	0.1770	0.2120	0.1548	0.1088
	6.9198	3.3890	5.8790	5.7609	5.4112	7.9293	8.3540	8.5720	4.9110	7.7323
	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

$\beta_0, \beta_i, \beta_j, \beta_k$ are the coefficients two values succeeding each Coefficients are the Z-Statistics and P-Values respectively for all the Asian Pacific countries for the time period of December 2007 to December 2012. Where as β_0 **is the constant** β_i is the coefficient of the lagged square error term ε_{t-1}^2 , β_j is the coefficient for square of conditional variance lagged term σ_{t-j}^2 , β_k is the coefficient for the asymmetric term capturing volatility $\varepsilon_{t-i}^2 I$ where as **I** is the dummy variable.

Table 4.5 TGRACH-M Mean Equation

Mean Equation	*AUSTRALIA*	*CHINA*	*HONG KONG*	*INDIA*	*INDONESIA*	*JAPAN*	*KOREA*	*MALAYSIA*	*PAKISTAN*	*TAIWAN*
SQRTσ_t^2	-0.0086	0.0318	-0.0298	-0.0470	0.1181	-0.1023	-0.0271	0.1238	-0.2192	-0.0205
	0.1131	0.3530	-0.4193	-0.6900	1.5081	-1.2501	-0.3384	0.3279	-3.6359	-0.2426
	0.9099	0.7241	0.6750	0.4902	0.1315	0.2113	0.7351	0.7430	0.0003	0.8083

SQRT$\sigma_t^2$is the coefficient for risk two values succeeding each Coefficients are the Z-Statistic and P-Value respectively for all the Asian Pacfic countries for the time period of December 2007 to December 2012.

In the above table 4.5 all the coefficient of GJR-GARCH in Mean term for Australia, Honk Kong, India, Japan, Korea and Taiwan are negative and highly insignificant. Where in Pakistan case the coefficient is negative and highly significant suggesting that the risk and return trade off does not exists according to the standard finance capital asset pricing model the return are directly proportional to risk i.e., as the risk increases the expected return should also increase but in case in Pakistan this relationship does not holds. Such relationship where the positive risk and return tradeoff does not exist is explained by behavioral finance concept called disposition effect which is aligned to the prospect theory given by Khanman and Taverskey (1979). Due to this the investors in Pakistani markets are loss averse and tend to hold losing position in case of loss. We suspect that the positive risk and return trade off exists in case of china, Indonesia and Malaysia where the investor demand high return for high risk. In case of Pakistan the investors are sufferers of loss aversion bias, but we found little evidence of loss aversion bias in case china, Malaysia and Indonesia.

5-CONCLUSION

The study conducted is the empirical investigation of the relationship among asymmetric volatility, leverage effect and disposition effect we have used GJR-GARCH/GJR-GARCH model introduced by Glosten, Jagannathan, and Runkle (1993) methodology to check the expected relationship, the GJR-GARCH-M model is used to check the risk and return tradeoff and variance equation of GJR-GARCH is checked for possible leverage effect. In the mean equation of GJR-GARCH-M we are checking the risk return tradeoff. If the risk return tradeoff exists than investors of particular market would be said to be risk averse in gain domain and risk seeker in loss domain. The second portion of GJR-GARCH-M in variance equation would tell us about the asymmetric volatility and leverage effect. If the asymmetric term of GJR-GARCH-M is negative and significant would imply that there is no evidence of leverage effect.

Higher risk is too be undertaken for yielding higher returns which is not the case in real world scenarios which may be due to some behavioral constraints, after all the investors are humans whom could be subject to a lot of biases while making investment decisions which could lead to arbitrary or irrational decisions. The people are willing to take higher risk for a lower return which leads to holding of loser securities in the hope that the bad investments would become good over the period of time. Individuals respond to losses or gains, the empirical evidence of this paper supports the theory given by Daniel Khanman and Amos Taversky in 1975, the investors are not willing to forgo the securities which are pure loss but tend to dispose of securities which have just entered into gain domain over a little uptick which leads to longer holding periods an illiquidity in the market. As to the conditional mean and the conditional standard deviation have a negative relationship due to negative coefficient, our results conclude that among the Asian pacific countries the Australia, Hong Kong, Japan, Korea, Taiwan, India and Pakistan there is no evidence of positive risk and return tradeoff hence there is strong evidence of disposition effect and loss aversion bias.

Where as in case of china, Malaysia and Indonesia the positive risk and return trade is expected to be less influenced by loss aversion and disposition effect as to the conditional mean has a positive relationship between the conditional standard deviation and the p-value is insignificant. The conditional variance is dependent on the asymmetric term defined by the dummy variable having positive coefficients for all the Asian pacific stock exchanges. The results of asymmetric volatility confirm that all Asian pacific countries confirm the existence of leverage effect which are consistent with the studies of Black, (1976) Christie, (1982), Nelson, (1991), Schwert, (1990) and Pagan and Schwert, (1989) Cunha, (2009), Hibbert et al., (2008), Campbell et al. (1993), Shefrin and Statman, (1985) hence confirm the disposition effect.

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