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A COMPARISON OF STYLIZED FACTS IN CONVENTIONAL AND ISLAMIC MARKET IN MALAYSIA USING COMPONENT GARCH MODEL

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Abstract

This paper study the most common discussing empirical facts which are the volatility persistence, volatility clustering, risk premium, leverage effects and tail behavior that normally arise in the stock market returns of conventional market and Islamic market in Malaysia. The model used are GARCH (1,1), TARCH(1,1) and CGARCH(1,1). The first result reveals that TGARCH with student's t distribution is the best fitted model which is explained by using AIC and SIC analysis. The significant coefficient of long memory in CGARCH model in both markets suggest that CGARCH provide best fit for long memory behavior. The empirical results estimation suggests that the conditional variance is highly persistence and the volatility clustering is observed in conventional and Islamic markets. The positive coefficients of risk premium suggest that both conventional and Islamic stock markets exhibit higher returns with higher level of risk. The coefficient of leverage effects is significant and positive for both conventional and Islamic markets.

Keywords: Volatility persistence, Risk premium, Leverage effects, Tail behavior

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PERBANDINGAN FAKTA YANG DIOLAH DALAM PASARAN KONVENSIONAL DAN ISLAM DI MALAYSIA MENGGUNAKAN KOMPONEN GARCH MODEL

Abstrak

Kertas kajian ini mengkaji fakta gaya empirik yang sering dibincangkan oleh penyelidik iaitu kemeruapan berkelompok,kemeruapan berketetapan, premium risiko,kesan leveraj dan taburan hujung pulanganyang selalunya wujud di dalam pulangan pasaran saham Konvensional dan Islamik di Malaysia. Model yang digunakan di dalam kajian ini adalah GARCH(1,1), TARCH(1,1) and CGARCH(1,1). Keputusan pertama membandingkan model yang paling tepat dalam menganalisis pulangan pasaran saham adalah TGARCH berdasarkan ujian-t dengan menggunakan analisis kriteria maklumat Akaike (AIC) dan Schwarz (SIC).Koefisien yang mewakili kemeruapan kebersandaran jangka masa panjang menunjukkan nilai yang signifikan dengan menggunakan model CGARCH menunjukkan yang modelt CGARCH adalah yang paling sesuai untuk menganalisin kesan jangka masa panjang. Keputusan penggangaran empirik menunjukkan yang wujud kemeruapan berketetapan tinggi dan berkelompok dalam pulangan pasaran saham Konvensional dan Islamik. Koefisien yang mewakili premium risiko bernilai positif menunjukkan kedua-dua pasaran saham samaada konvensional mahupun Islamik mempunyai keupayaan memperolehi pulangan yang tinggi dengan kadar risiko yang tinggi. Manakala koefisien untuk kesan leveraj adalah positif dan significant bagi kedua-duapasaran saham Konvensional dan Islamik.

Katakunci : Volatility persistence, Risk premium, Leverage effects, Tail behavior

INTRODUCTION

In financial market, volatility exists when stock market price having price fluctuations from one day to another day in both directions. Volatility can measure how quickly and widely the stock prices can change that may result from the market forces. Most traders in financial markets understand the important of volatility to quantify the market risk and desire a good volatility model that can be used not only to measure the volatility but also to capture and reflect the stylized facts that normally present in financial markets. Study done by (Engle & Patton, 2001) shows that the best volatility model can forecast and capture stylized facts and found that the persistence in volatility, mean reverting behavior, the leverage effects and risk premium may have a significant influence on volatility. Study done by (Todea, 2016) investigates the relationship of market integration and volatility persistence where the result found that the more integrated the market, the more persistence is the market. Furthermore, (Goudarzi , 2011) found that

negative news has more impact on Indian stock market volatility compared to good news. Findings by (Li, Ghoshray, & Morley, 2012) and and (Santos, Klotzle, & Pinto, 2016) show that the risk premium and long memory behavior is significant and important in modeling the currencies and exchange rate analysis. In addition, (Caiado, 2004) study reveals that that leverage effects and high persistence in volatility existed in the daily stock returns of the Portugese stock market. (Long, Tsui , & Zhang, 2014) finding reveals that the leverage effects that existed in Shanghai and Shenzen markets also influenced by the day of the week effect which uphold the efficient market hypothesis theory because traders can choose which day to trade to gain excess returns.

These papers apply the symmetrical GARCH model and asymmetrical models which are TARCH and CGARCH model. Historically, the symmetrical effects of positive and negative innovations on conditional volatility has been discussed widely by using volatility models such as GARCH introduced by (Bollershev, 1986) and EGARCH introduced by (Nelson, 1991) models. Instead of analyzing the fluctuation effect, the extension of EGARCH can be used to capture other stylized facts in financial time series for example volatility clustering, volatility persistence and the asymmetric impact of good and bad news. These sign of the innovation may influence the volatility with the same magnitude as suggested by (Engle & Ng, 1993). As an extension from EGARCH model, (Zakoian, 1994) introduced the TARCH model which also known as GJR-GARCH model to deal with the asymmetric effect between positive and negative returns. The long memory behavior effect is discussed by using CGARCH model introduced by (Engle & Lee, A Long-Run and Short-Run Component Model of Stock Return Volatility, 1999) and (Ding & Granger, 1996). This model is the extension of GARCH model which contains two components to capture the short-run innovation impact and the long-run impact of innovation. Nowadays, the study of Islamic finance become a great interest are widely discussed among financial practitioner, researchers and academicians.

In Malaysia, the Islamic finance remains to develop quickly. Currently, Malaysia's Islamic banking assets reached USD65.6 billion with an average growth rate of 18-20% annually (Central Bank of Malaysia, 2016). Study done by (Bhatt & Sultan, 2012) found that the Shariah compliant stocks show lower risk premium compared to the conventional market. The risk premium result consistent with (Albaity & Ahmad, 2011) where Islamic markets exhibit no risk premium but there is an existence of the leverage effect. Moreover, (Cheong, Isa, Nor, & Lai, 2014) proves that Shariah market has common empirical facts compared to conventional market in term of heavy-tailed, leverage effect, volatility clustering and long memory behavior. Study by (Bekri & Kim, 2014) shows that Islamic stocks exhibits asymmetry, heavy-tail and volatility clustering. This paper aims to explain the most common stylized facts discussed which are the volatility persistence, volatility clustering, risk premium, leverage effects and tail behavior in conventional and Islamic market in Malaysia.

METHODOLOGY

In this paper, the EVIEWS software was used to model the conditional mean and variance of stock market returns for FTSE Bursa Malaysia KLCI Index (KLCI), FTSE Bursa Malaysia EMAS Shariah Index (FBMS) and FTSE Bursa Malaysia HijrahShariah (FBMHS). The Autoregressive Conditional Heterokedasticity (ARCH) models used in this paper are GARCH (1,1), EGARCH (1,1) and CGARCH(1,1). The simplified CGARCH (1,1) equation is given as follow

$$\sigma_t^2 = \sigma_{LR,t}^2 + \sigma_{SR,t}^2 \qquad (1)$$

where

$$\sigma_{LR,t}^2 = \omega + \gamma_{LR1}\sigma_{LR,t-1}^2 + \gamma_{LR2}(z_{t-1}^2 - \sigma_{t-1}^2)$$
$$\sigma_{SR,t}^2 = \gamma_{SR1}\sigma_{SR,t-1}^2 + \gamma_{SR2}(z_{t-1}^2 - \sigma_{t-1}^2)$$

The expression $z_{t-1}^2 - \sigma_{t-1}^2$ affect the transitory and permanent volatility parts in term of their $\alpha + \beta$ condition. For the short-run transitory effect, the mean reversion converge to zero at the given power$\alpha + \beta$and performs like a GARCH model. On the other hand, the long-run component m_t converge to a constant ω at the given power ρ. . The ρ normally lies from 0.99 and 1 so that the $m_t$will evolve slowly in autoregressive mode. The asymmetric CGARCH (1, 1) is determined by adding the asymmetric coefficient ϕ in the transitory equation as shown in equation (1).

$$\sigma_{SR,t}^2 = \gamma_{SR1}\sigma_{SR,t-1}^2 + \gamma_{SR2}(z_{t-1}^2 - \sigma_{t-1}^2) + \phi(z_{t-1}^2 - \sigma_{t-1}^2)\mathrm{l}_{t-1} \quad (2)$$

where *l* represents the dummy variable to show the negative innovation and the positive value of ϕ describes the existence of transitory leverage effects in the conditional variance.

This model also explains on the influence of good news and bad news on volatility where the volatility will increase by the existence of bad news $(\varepsilon_{t-1} < 0)$and decrease with the existence of good news $(\varepsilon_{t-1} > 0)$. Positive information has an impact of α while negative information has an impact of $\alpha + \gamma$. These relationship between information and volatility is defined as follow:

$$I_t = \begin{cases} 1, & \varepsilon_t < 0 \\ 0, & \varepsilon_t > 0 \end{cases} \qquad (3)$$

This model also explains on the leverage effect that occasionally existed in stock market return. The stock market is said to have leverage effect when $\gamma > 0$. On

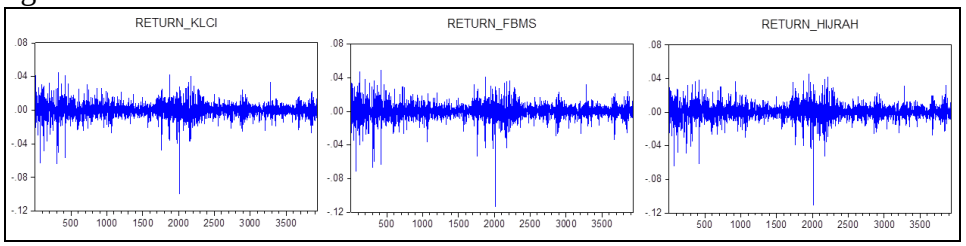
the other hand, the stock market shock is in asymmetric condition when $\gamma \neq 0$ and symmetric when $\gamma = 0$.

EMPIRICAL RESULTS

Data and Descriptive Statistics

The data that have been used were downloaded from the Bloomberg which consist of FTSE Bursa Malaysia KLCI Index (KLCI), FTSE Bursa Malaysia EMAS Shariah Index (FBMS) and FTSE Bursa Malaysia HijrahShariah (FBMHS). The data was used to analyze the daily data time series prediction during trading day's period of 2000 – 2015 with approximately 3935 total number of observations.The return series for all markets are graphed in Figure 1. The graphs show obviously the existence of volatility clustering for all stock markets where large changes tend to be followed by large changes, of either sign, and small changes tend to be followed by small changes. One big fluctuation has caused another big fluctuation. These volatility clustering for all market are all about the same period. The time series return also show the signs of heterokedasticity with mean return very close to zero as illustrated in Figure 1.

Figure 1: Stock Price Returns Performance for Period 2000 – 2015



Source : Eviews

Table 1 presents the summary statistics for stock market returns KLCI, FBMHS and FBMS respectively. There are small differences between minimum and maximum values among the three stock markets. Based on the standard deviation, FBMS has the highest volatility followed by FBMHS and KLCI respectively, but in contrast, the coefficient of variation, $\left(CV = \frac{s}{\bar{x}} \right)$ for FBMHS is much lower than FBMS and KLCI. The condition of normal distribution has been violated by all series since the values of skewness do not equal to zero. All stock markets have positive skewness which indicated that the returns are biased to the right side of the distribution. Referring to the coefficient of kurtosis, the return distributions of all three stock market have coefficients larger than three (13.053, 14.567 and 15.419) which mean the thickness in the tail of all stock markets feature leptokurtic distribution as shown in Figure 1. Finally, the Jacque-Bera p-value

show the probability value less than 0.05 thus all stock markets are significantly violated the normal distribution criteria thus rejects the normal distribution in all series.

Table 1: Descriptive Statistics of Stock Price Return of KLCI, FBMS and FBMHS for period 2000 – 2015

	KLCI	FBMHS	FBMS
Mean	0.000180	0.000304	0.000178
Median	0.000402	0.000396	0.000379
Maximum	0.045027	0.045368	0.049195
Minimum	-0.099785	-0.110873	-0.113205
Std. Dev.	0.008479	0.008677	0.008935
Skewness	-0.830834	-0.865108	-1.011009
Kurtosis	13.05348	14.56654	15.41918
Jarque-Bera	17024.39	22425.98	25958.65
Probability	0.000000	0.000000	0.000000
Observations	3935	3935	3935

Source: E-views 8

The returns are modeled in E-views using equation $r_t = \log\left(\frac{P_t}{P_{t-1}}\right)$ where P_t represents the daily stock market prices of KLCI, FBMS and FBMHS for trading period 2000-2015. The residuals have been tested for autocorrelation by using Ljung Box test (Q-stats). The residuals for all series in normal distribution show strong correlation on the earlier lags compared to series in student's t where the series start to show correlation at lag 12. The squared residuals showed significant autocorrelation on the earlier lags for all stock markets, thus suggests that the variance could be used to model the autoregressive process. The heterokedasticity test using Eagle test with lags 12 rejects the null hypothesis in all series which mean the ARCH effect are existed in each series samples. This suggested that residual or error term is conditionally heteroscedastic and can be represented by

using GARCH family models. They are three GARCH models that have been used in this paper which are GARCH, TARCH and CGARCH to estimate the risk premium, volatility persistence, and leverage and asymmetry effect of stock returns with two type of distributions, normal distribution and student's t.

Estimation Results

The stationary test has been tested for all stock markets by using the Augmented Dickey–Fuller test (ADF) introduced by Dickey and Fuller (1979). All stock market returns has no unit root thus the series are said to be stationary. The persistence of volatility shocks can be seen through the sum of α and β. The condition of stationary is met when $\alpha + \beta = 1$, thus the forecasts will be constant as the forecast horizon increases. For $\alpha + \beta > 1$, the forecasts will keep on growing and will tend to approach infinity as the forecast horizon increases. On the other hand, if $\alpha + \beta < 1$ the forecasts will converge towards the unconditional variance $\frac{\alpha_0}{1-(\alpha_1+\beta_1)}$as the forecast horizon increases.

Table 2: Estimation Results for KLCI Stock Return (2000-2015)

Estimation	KLCI					
	GARCH (1,1)		TARCH-n		CGARCH-n	
	Normal	stud t	normal	stud t	normal	stud t
Risk Premium	0.1102*	0.065	0.080	0.047	0.071	0.031
Conditional mean	0.000	0.000	0.000	0.000	0.000	0.000*
Lag one effect	0.1665*	0.1342*	0.1721*	0.1378*	0.1694*	0.1297*
Conditional variance (ω)	0.000*	0.000*	0.000*	0.000*	0.000*	0.000*
ARCH effect (α)	0.1205*	0.1215*	0.0743*	0.0834*	0.0844*	0.0737*
GARCH effect (β)	0.8711*	0.868*	0.8702*	0.8673*	0.7255*	0.7238*
News impact (γ)	-	-	0.0867*	0.0724*	0.0836*	0.0918*
Volatility persistence $(\alpha+\beta)$	0.992	0.990	0.945	0.951	0.810	0.798
Long memory	-	-	-	-	0.9961*	0.9967*
Degree of freedom ,df	-	5.688	-	5.814	-	6.160

Source: Eviews 8 (*The coefficient of parameter represents 5% level of significant

Table 3
Estimation Results for FBMS Stock Return (2000-2015)

Estimation	FBMS					
	GARCH (1,1)		TARCH-n		CGARCH-n	
	normal	stud t	normal	stud t	normal	stud t
Risk Premium	0.082	0.063	0.046	0.040	0.015	0.073
Conditional mean	0.000	0.000	0.000	0.000	0.000	0.000
Lag one effect	0.1619 *	0.131*	0.1625 *	0.1351 *	0.1543 *	0.13*
Conditional variance (α)	0.0000 *	0.000*	0.0000 *	0.0000 *	0.0000 *	0.0001 *
ARCH effect (α)	0.1269 *	0.1117 *	0.0763 *	0.0742 *	0.0403 *	0.023
GARCH effect (β)	0.8693 *	0.8796 *	0.8702 *	0.8758 *	0.7798 *	-0.373
News impact (γ)	-	-	0.0919 *	0.0773 *	0.0163 *	-0.034
Volatility persistence $(\alpha + \beta)$	0.996	0.991	0.947	0.950	0.820	-0.351
Long memory	-	-	-	-	0.9964 *	0.991*
Degree of freedom ,df	-	5.073	-	5.184	-	5.052

Source: Eviews 8 (*The coefficient of parameter represents 5% level of significant)

Table 4
Estimation Results for FBMHS Stock Return (2000-2015)

Estimation	FBMHS					
	GARCH (1,1)		TARCH-n		CGARCH-n	
	normal	stud t	normal	stud t	normal	stud t
Risk Premium	0.089	0.074	0.059	0.062	0.1083 *	0.0769 *
Conditional mean	0.000	0.000	0.000	0.000	0.000	0.000
Lag one effect	0.1476 *	0.1105 *	0.1460*	0.1120 *	0.1440 *	0.1113 *
Conditional variance (ω)	0.000*	0.000*	0.000*	0.000*	0.000*	0.000*
RCH effect (α)	0.1093 *	0.0911 *	0.0759*	0.0654 *	0.0344 *	0.046
GARCH effect (β)	0.8842 *	0.8993 *	0.8820*	0.8984 *	0.7071 *	-0.428
News impact (γ)	-	-	0.06702 *	0.0506 *	0.1202 *	-0.051
Volatility persistence $(\alpha + \beta)$	0.994	0.990	0.958	0.964	0.742	-0.382
Long memory	-	-	-	-	0.9963 *	0.9904 *
Degree of freedom ,df	-	4.792	-	4.845	-	4.792

Source: Eviews 8 (*The coefficient of parameter represents 5% level of significant)

Table 2-4 display the parameters estimation for simple GARCH (1,1) and parsimonious GARCH (1,1), TARCH (1,1) and CGARCH(1,1) for daily stock returns of KLCI, FBMS and FBMHS based on normal distribution and student's t distribution. In the variance equation, the first three coefficients (ω, α and β) are significant for normal and student's t distribution but not significant for CGARCH models using student's t distribution in Islamic markets, FBMS and FBMHS. The significant values of α and β shows that lagged conditional variance, σ^2 and squared residuals, ε^2 has an impact on the conditional variance, σ_t^2 which means news about volatility from past periods has impact on current volatility. The sum of the estimated ARCH and GARCH coefficients $\alpha + \beta$ close to 1 for all models and both distributions suggest that the volatility is highly persistence. This high persistence in volatility for both conventional and Islamic market show that today's return has a large effect on the future forecasted variance numerous times in the future which consequentl

show that volatility clustering is observed in both conventional and Islamic markets.

Even though the coefficients of CGARCH mostly are not significant, the long memory parameters for all markets are significant and show that the long memory behavior is exist in both conventional and Islamic markets. The positive coefficients of risk premium for all three models used suggest that both conventional and Islamic stock markets exhibit higher returns with higher level of risk. The asymmetry in volatility test by using asymmetric models proves that the coefficient of leverage effects is significant and positive for all markets which show that the bad news has larger effects on the volatility compared to good news. In term of tail probabilities, KLCI market indicated the degree of freedom from 5.7 to 6 which is higher compared to FBMS (5.0 to 5.1) and FBMHS (4.7 to 4.8). This implied that the conventional market is slightly heavier than the Islamic markets which means the conventional market consist of the most extreme returns values compared to the Islamic market.

Table 5
Model Selection Criteria and Diagnostic Test for KLCI, FBMS and FBMHS

		GARCH (1,1)		TARCH (1,1)		CGARCH (1,1)	
		norm	stud' t	norm	stud' t	norm	stud' t
KLCI	AIC	-7.046	-7.114	-7.054	-7.118	-7.046	-7.114
	SIC	-7.037	-7.103	-7.043	-7.105	-7.033	-7.1
	residual squared Q-(12)	12.328	11.729	12.255	12.075	3.749	3.208
		(0.420)	-0.468	(0.425)	(0.440)	-0.988	-0.994
		0.958	0.916	0.973	0.966	0.309	0.263
	ARCH (12) test	-0.487	(0.530)	-0.473	-0.479	(0.988)	-0.994
FBMS	AIC	-6.971	-7.055	-6.981	-7.059	-6.986	-7.053
	SIC	-6.962	-7.044	-6.97	-7.047	-6.972	-7.038
	residual squared Q-(12)	8.013	7.432	7.371	6.514	3.501	7.401
		-0.784	-0.828	-0.832	-0.888	-0.991	-0.83
		0.632	0.574	0.605	0.522	0.287	0.572
	ARCH (12) test	-0.817	-0.865	-0.84	-0.902	-0.992	-0.866

	AIC	-6.97	-7.054	-6.976	-7.057	-6.985	-7.053
	SIC	-6.96	-7.043	-6.964	-7.044	-6.97	-7.037
FBMHS	residual squared Q-(12)	10.44	9.844	9.797	8.85	4.475	8.906
		-0.577	-0.63	-0.634	-0.716	-0.973	-0.711
		0.84	0.77	0.81	0.707	0.365	0.698
	ARCH (12) test	-0.609	-0.682	-0.641	-0.746	-0.975	-0.755

Source: Eviews 8

Table 5 displays the value of Akaike information criterion (AIC) and Schwarz information criterion (SIC) for KLCI, FBMS and FBMHS based on normal and student's t distribution. The lowest value of AIC and SIC means the model is the best fitted model for the respective stock market. For all stock markets, TARCH (1,1) model using student's t distribution has the lowest value of AIC and SIC thus it is the best fitted model for both conventional and Islamic markets. The diagnostic checking shows that for all stock markets, the p-values of residual squared test are greater than 0.05 which is significant therefore there is no serial correlation in the TARCH (1,1) model using student's t distribution (student for all three markets (KLCI, FBMS and FBMHS). The ARCH tests also indicate that the TARCH (1,1) model using student's t distribution has no ARCH effect and the residuals are normally distributed.

CONCLUSION

A number of stylized facts often seen and consistently discussing in previous studies involving forecasting and estimating the financial market risk. The AIC and SIC analysis has been done to check the best fitted models between GARCH(1,1), TARCH(1,1) and CGARCH(1,1) and the result reveals that TARCH(1,1) is the best fitted models for both conventional and Islamic markets. The coefficient parameters of all three models for all stock markets are significant except for CGARCH model of the Islamic markets. However the significant coefficient of long memory in CGARCH model in all markets suggest that CGARCH provide best fit for long memory behavior. From the statistical and empirical results, both conventional and Islamic market exhibit high persistence in volatility. The presence of volatility clustering can be seen in both markets where the period of high volatility are followed by periods of high volatility and periods of low volatility tend to be followed by period of low volatility. The asymmetry in volatility test by using asymmetric models Threshold ARCH (TARCH) and Component ARCH (CGARCH) indicates that the coefficient of leverage effects is significant and positive for all markets which show that both markets are more responsive to the bad news. There are the existence of long memory behavior for both markets. The positive coefficients of risk premium for all three models used suggest that both conventional and Islamic stock markets exhibit higher returns with higher level of risk. The tail behavior analysis shows that the conventional market is slightly heavier than the Islamic market. As a conclusion, both market conventional and Islamic markets show the existence of risk premium, volatility persistence, volatility clustering, and leverage effect, long memory and tail behavior in the same direction. This might be because in Malaysia, the Shariah compliant stocks (FBMS and FBMHS) are about 80% of stocks listed under conventional market (KLCI). Further study will be focuses more on the effect long memory volatility behavior towards the market efficiency by using Efficient Market Hypothesis (EMH) theory.

REFERENCES

Albaity, M., & Ahmad, R. (2011). Return performance, leverage effect, and volatility spillover in. *Investment Management and Financial Innovations*, 161-171.

Bekri, M., & Kim, A. (2014). Portfolio Management with Heavy-tailed Distributions in Islamic Finace. *Journal of Islamic Economics, Banking and Finance*, 114-129.

Bhatt, V., & Sultan, J. (2012). Leverage Risk, Financial Crisis, and Stock Returns: A Comparison among Islamic, Conventional, and Socially Responsible Stocks. *Islamic Economic Studies*, 87-143.

Bollershev, T. (1986). Generalized Autoregressive Conditional Heteroskedasticity. *Journal of Econometrics*, 307-327.

Caiado, J. (2004). Modeling and Foresacting the Volatility of the Portugese Stock Index PSI-20. *Estudos de Gestão*, 3-22.

Cheong, C. W., Isa, Z., Nor, A., & Lai, N. (2014). The Stylized Facts and Market Risk Evaluations of Malaysian Shariah Index. *Journal of Statistics and Management Systems*, 251-264.

Ding, Z., & Granger, C. (1996). Modeling Volatility Persistence of Speculative Returns: A New Approach. *Journal of Ecometrics*, 185-215.

Engle, R. F., & Patton, A. J. (2001). What good is a volatility model? *QUANTITATIVE FINANCE*, 237-245.

Engle, R., & Lee, G. (1999). *A Long-Run and Short-Run Component Model of Stock Return Volatility*. Oxford: Oxford University Press.

Engle, R., & Ng, V. (1993). Measuring and Testing the Impact of News on Volatility. *The Journal of Finance*, 1749-1778.

Goudarzi , H. (2011). Modeling Asymmetric Volatility in the Indian Stock Market. *International Journal of Business and Management* , 221-231.

Li, D., Ghoshray, A., & Morley, B. (2012). Measuring the risk premium in uncovered interest parity using the component GARCH-M model. *International Review of Economics and Finance*, 167-176.

Long, L., Tsui , A., & Zhang, Z. (2014). Conditional heteroscedasticity with leverage effect in stock returns:. *Economic Modelling*, 89-102.

Nelson, D. B. (1991). Conditional Heteroskedasticity in Asset Returns: A New Approach. *Econometrica*, 347-370.

Santos, M. B., Klotzle, M., & Pinto, A. (2016). Evidence of risk premiums in emerging market carry trade. *Journal of International Financial Markets, Institutions & Money*.

Todea, A. (2016). Cross-correlations between volatility, volatility persistence and stock market integration: the case of emergent stock markets. *Chaos, Solitons & Fractals*, 208-215.

Zakoian, J.-M. (1994). Threshold heteroskedastic models. *Journal of Economic Dynamics and Control*, 931-955.