Do changes in shariah screening methodology make islamic indices substitutes or complements? an application of MGARCH-DCC and markov switching analysis.

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Do changes in shariah screening methodology make islamic indices substitutes or complements? an application of MGARCH-DCC and markov switching analysis.

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Abstract: Many studies have examined the portfolio diversification opportunity of the Shariah compliant indices returns and markets including Malaysia. For the case of Malaysia, most of the recent studies have found lesser possibilities of diversification due to the trading partnerships and regional market contingencies. However, in this study, we apply MGARCH-DCC and use the MS-AR technique, for the first time to the best of our knowledge, to investigate the impact of the newly introduced Shariah screening methodology taking the Malaysian shariah FTEM index as a case study together with other 5 Islamic indices to assess the extent of portfolio diversification particularly after the new change as well as to identify the periods of stable and high volatilities. The findings of this study are consistent with the recent findings of (Najeeb et.al (2015); Rahim and Masih (2016)) with regards to portfolio diversification despite recent changes in the Shariah screening methodology. Nonetheless, with regards to the regime change and the probability duration of FTEM, we found that the shift from the stable to volatile regime normally takes place after 9 weeks with the probability of staying in each regime 66 and 75 weeks respectively. Therefore, the new screening methodology has yet to shift Islamic indices from being a substitute to a complement. Finally, the findings of this paper may provide some insights to both Islamic equity investors and policy makers of the Islamic finance industry.

Key Words: Shariah, Screening Methodology, Islamic Indices, MGARCH-DCC, Markov Switching

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1. Introduction: The Issue Motivating the Study

The fast growth in the Islamic finance industry and its resilience to the recent global financial crisis compared to its conventional counterparts is not only the mere prohibition of *riba* but largely due to the impacts of the Shariah screening methodologies that scrutinize the industry against the unethical investment practices as well as curbing the investors' appetite from taking unnecessary risks. A vast number of empirical studies as mentioned in the literature section below have shown the superiority of Islamic finance in contrast to the conventional finance particularly in the case of portfolio diversification using the Islamic indices. However, the superiority of the Islamic indices comes from their Shariah compliance. Hence, the first Shariah screening methodology has been initiated by the Malaysian security commission (SC) in the mid-1990s in which they have introduced two quite relaxed qualitative and quantitative benchmarks taking into consideration the necessity for the Muslim investors to participate in the creation of wealth through their investment in the shariah compliant equities as well as the infancy of the Islamic finance industry which is in need of sustainable growth. Meanwhile, nine years later, the Dow Jones index has created a more stringent shariah screening methodology in 1999 (Nur Hamizah, 2014). Nevertheless, since then the number of the Shariah compliant stocks have increased both through different markets, industries and countries such as Pakistan which has introduced her own screening criteria called the Karachi-Meezan index that has the highest interest bearing debt to total asset of 37% (Nur Hamizah, 2014) . The Dow Jones screening methodology for the shariah compliant companies must pass all product, business activities, debt levels and interest and expenses to be eligible. Nevertheless, in November 2013, Malaysia SC has revised the old Shariah screening methodology and has adopted the two-tire quantitative benchmarks that represent the business activity and the new financial ratio besides the already existing qualitative benchmarks. So far a great deal of

studies have been conducted in assessing the efficiency of shariah compliant stocks compared to the conventional or the non-shariah compliant stocks and their benefits in the diversification of the investors' portfolio. To the best of our knowledge, there is no empirical studies that have investigated the impacts of this Shariah screening revision with respect to its peer Islamic indices. Therefore, the aim of this paper is to examine using the MGARCH-DCC approach whether the current change in the Shariah screening methodology by SC in Malaysia makes Islamic indices returns substitute or complement as well as to identify the regime changes of the Malaysian Islamic index FTEM using the Markov switching test. This study is the first empirical attempt that investigates this new issue of the change in the Shariah screening methodology using these relatively advanced econometric tools. It is crucial for both institutional investors and individuals to take the right decisions in constructing their diversified portfolios. Moreover, the findings of this study may provide some insightful information concerning the issue of global Shariah screening harmonization.

2. Objective of the Study

Malaysia is the first Muslim country that has introduced the Shariah screening methodology in the 1990s and followed by Dow Jones in 1999. The implementation of the screening criteria even though had been opposed by some Shariah scholars considering it as a means to Sada Al dharai. However, it was well accepted -as a first initiative- by the other group of scholars based on the principles of public interest (*Maslaha*) and Juristic preference *(Istihsan)*. Indeed, despite the critics and allegations of the previous relaxed methodology, it was a good approach for both Muslim and non-Muslim investors who seek portfolio diversification. As a result of that, there has been this rapid growth in Islamic finance. Nevertheless, conservative Muslim investors have been skeptical due to their concern of indulging in harmful investment even though it might be minimum.

Therefore, this concern which originated from rich individual, large companies and countries, it was utilized by the Dow Jones and has offered a stricter Shariah screening criteria methodology. The current existing literature mainly concentrates on the permissibility and prohibitions from the shariah issues perspective, and from the diversification of portfolio in the case of investors. In these regards, the views of the different schools of jurisdictions were thoroughly discussed including the contemporary views which support the Shariah screening methodologies as the only available option irrespective of the views of the proponents. Meanwhile, from the point of view of the portfolio investors, it is more advantageous the more the Islamic indices are different from their conventional counterparts since this will create the negative correlation which is beneficial for their portfolio diversification. Nevertheless, a new revision has been introduced by SAC in November 2013 in the case of the Malaysian Shariah screening methodology which makes it more stringent compared to its previous criteria. To the best of our knowledge, with regards to this revised criteria, there is no empirical study that analyses its impacts and its relationship with the other major equity indices as well as studies that assess the change of regimes and duration of this change. Therefore, the objective of this paper is to empirically examine the portfolio diversification benefits before and after the newly introduced revision of the Shariah screening methodology using MGARCH-DCC approach. Furthermore, we employ the Markov switching AR technique to investigate the probabilities of regime change and their durations for the Malaysian FTEM index after the revision of the shariah screening methodology. Hence, the findings of this study is important for policy makers, practitioners and individual investors in the following ways: First, the results of MGARCH-DCC would give good insight to the shariah-compliant investors in their investment strategy of portfolio diversification within the Islamic stock indices. Second, policy makers, particularly, the different Shariah authorities that set the shariah resolutions will obtain a

more realistic information feedback with regards to the effects and influences of their resolution. Third, practitioners could also infer the extent to which Shariah rules amendments affect the Islamic indices and investors' decisions thereby adjust their funds' portfolios to avoid the Shariah risks and maximize their returns. Finally, the regime shift findings of the Markov switching AR and its duration may provide some crucial information that could assist fund managers in identifying the durations and probabilities of changes between the two regimes given the current environment of economic regime uncertainty.

3. Literature Review

Every activity in Islam is considered as a form of worship particularly, the economic activities. Therefore, it must be compliant with Islamic Shariah law to be accepted. Due to this condition and the forbiddance of interest rate and since the inception of the Islamic Banks by the late dedicated Islamic economist Dr. Ahmed Al-Najar, the industry has grown from one Islamic Bank in the 1970s into more than 300 in more than 75 countries with a high annual growth rate that exceeds 15% mainly in East and South Asia (El-Qorchi, 2005). The reasons behind this fast development was attributed to the positive impacts of the industry to the economic development and its resilience to the global financial crises compared to its conventional counterparts; a theory that have been identified by Ibn Khaldun in his book Al Muqaddimah (Nab, 2013).The theory of Ibn Khaldun as mentioned by the latter emphasizes the great role of investment that leads to more development which subsequently creates higher wealth and larger savings. However, the realization of the sustainable development and financial stability requires from Muslim and non-Muslim investors to strongly uphold Islamic finance principles such as the application of profit and loss sharing and the prohibition of riba and abandon other immoral activities. Nevertheless, in a comparative analysis of the Islamic banking and conventional banks in terms of businesses

model, efficiency and stability, Thorsten Beck et.al (2012) have found that Islamic banks to have higher asset quality, better capitalized and less likely to be hit during crises and thereby having high stock performance. This claim is clearly verified by Dhankar and Mosab (2014) who mentioned that since its emergence in 1963 in Egypt, its importance has greatly much recognized after the 2008 financial crisis. The most important causes of the rapid growth of Islamic finance, its positive effects on the economy and the stability of the financial system are due to the shariah compliance of this industry as well as in investing in Shariah compliant portfolios of financial assets and indices. With regards to the contagion effects at the regional level in Asia, (Masih A. M., 1999) argued that the fluctuations in all the Asian stock markets are mostly explained by their regional markets rather than advanced markets. Meanwhile, (M. Shabri Abd. Majid, 2009) found that Asian stock markets in the ASEAN region to be cointegrated in both pre-and post- 1997 financial crises. However, in the case of the GCC emerging stock markets, (Hkiri, 2014) documented a strong increasing dependence among the GCC stock markets during the 2007/2008 financial crisis despite the frequent changes their co-movements after the 2007. Nevertheless, on the financial contingency effects on the emerging markets versus the US during the subprime crisis, (Celık, 2012) found that emerging markets to be the most influenced by the contagion effects. However, in the case of which market moves Malaysia, (Majid, 2006) highlighted that the Japanese stock market had significantly moves the latter compared to the U.S. due to the regional trade agreement of Malaysia with Japan.

However, in examining, the efficiency of the major global Islamic equity indices, Kabir Sarkar et.al (2014) has found that Islamic indices to have the same level of (in)efficiency as their mainstream indices, and the indices of MSCI and FTSE families turns to be more efficient. Meanwhile, the authors have found the existence of the long-run diversification benefits, in the

case of Dow Jones and S&P Islamic due to the absence of cointegration. However, in analyzing, the return performance and leverage effect on the DJI and FTSE, Ahmad and Albaity (2011) have found no significant differences in the returns of these assets as well as the absence of risk premium in each index, nonetheless, leverage effect was reported on all the screened indices which highlights the greater effects of bad news to price volatility compared to the good news. However, in investigating the performance superiority between Islamic and conventional indices using the DJI indices, Osamah Al-Khazali et.al (2014), have found that, during the recent global financial crisis, the Islamic equity indices of DJI to outperform the conventional ones. Meanwhile, in assessing the DJI indices exposure to the risk of interest rate, Shamsuddin (2014) has found that the overall Islamic indices portfolio immune to the risks of interest rate compared to the conventional portfolio of indices. Nevertheless, at the sectorial level the interest rate risk exposure is quite pronounced. In examining the degree of performance of FTSE Islamic in comparison to the FTSE All-World index, it has been found that while in the bull period the FTSE Islamic renders an abnormal returns, it, however, underperforms its counterparts in the bear market period (Hussen, 2004).

4. Overview of the selected Shariah Indices

In order to assess the recent changes in the shariah screening methodology in Malaysian, we have taken the FTSE Bursa Malaysia EMAS Shariah index which is solely screened according to the Malaysian Shariah Advisory council (SAC) screening methodology. The index was launched on 22nd, January 2007, with a base date of 31st, March 2006 and is reviewed semiannually in June and December. Meanwhile, the FTSE Bursa Malaysia Hijra Shariah index is also under the same index universe of FTEM and the same base year and review dates but it was launched in the 21st of May 2007. However, it has been formulated to be used as a Shariah compliant investment product that

meets the international investors' requirements, and it has been screened through both the SAC and the global Shariah Consultancy, Yassar Ltd. Nevertheless, the FTSE SGX Asia Shariah 100 index was created through the collaporation of the FTSE group and the Singapore Exchange in order to reflect the performance of the stocks of the companies in the Asian pacific region that their businesses comply with the Islamic principles of Shariah. The index comprise of the 100 largest companies from Japan, Singapore, Taiwan, Korea and Hong Kong, and it is screened by the Yassar Ltd. The index was launched on the 20th of February 2006 with the base year of 30th December 2005, and is reviewed quarterly in March, June, September and December ([1]). Furthermore, in addition to the three FTSE Shariah indices, we have included three of the Dow Jones Islamic indices that were established on the 24th of May 1999 with the base date on 29th of December, 1995. These three indices are the DJI world emerging markets, DJI Asia / Pacific and the DJI world developed. The reason we selected these indices is that firstly they are some of the largely used set of Shariah compliant indices as well as overseen by some of the prominent shariah scholars with a wealthy of experiences in Shariah and Shariah compliant equity products. In addition to the stringent screening methodology and the great scholars that oversee the indices, these indices are broad-market indices intended to measure the global universe of investible equities at the regional, country, industry and market capitalization under the Dow Jones Islamic Market World Index (indices, 2015).

[1] - FTSE- www.ftserussell.com

5. Data and Methodology

5.1. Data Sources and Description

All the data for this study are sourced from DataStream at the INCEIF terminal. The collected data is for a family of six indices: three from FTSE and the other three from the Dow Jones Islamic family indices. The indices of FTSE are FTSE Bursa Malaysia EMAS which was established on 3rd, April 2006; FTSE Bursa Malaysia Hijra Shariah on 28th, April, 2007 and FTSE SGX Asia Shariah 100 on 29/12/2000. Meanwhile, the Dow Jones Islamic are the Dow Jones Islamic World Emerging Markets on 29 /12/ 1995; Dow Jones Islamic Asia/ Pacific on 01/01/1996 and the Dow Jones Islamic World Developed on 01/01/1996. Given into consideration the requirement of our models, we have collected a daily long time series data for all the six indices that extends for six years starting from 01/01/2010 to 31/12/2015. However, for analyzing Markov of switching for FTEM, we have again collected a weekly data from 01/01/2013 to 31/12/2015 due to the support of the literature. The reason for analyzing two types of data set is because we are interested into two types of results: first, the volatility and correlation of FTEM index compared to the other five indices using the MGARCH-DCC, and the respective regimes of FTEM in the periods during the whole period and before and after the screening revision which will be analyzed using the Markov Switching model. To maintain the homogeneity and to avoid the possibility of errors and inconsistencies, we have taken the indices that are denominated in the United States Dollar. Nonetheless, Table 1 presents the selected indices for this research paper together with their symbols and definitions.

Table 1. Selected Indices for Research

Symbol	Definition
FTEM	FTSE BURSA MALAYSIA EMAS $ - PRICE INDEX
FTHJ	FTSE BURSA MALAYSIA HIJRAH SHARIAH $ - PRICE INDEX
FSAS	FTSE SGX ASIA SHARIAH 100 - PRICE INDEX
DJIE	DJ ISLAMIC WORLD EMERGING MKTS. - PRICE INDEX
DJID	DJ ISLAMIC WORLD DEVELOPED - PRICE INDEX
DJIA	DJ ISLAMIC ASIA/PACIFIC - PRICE INDEX

5.2. Methodology

5.2.1. Multivariate GARCH-Dynamic Conditional Correlation

Globalization and the development in technology in today's world has made the interaction between global financial markets to be very fast to the extent that the impacts in one market either positively or negatively could be transmitted to the other markets in a matter of minutes. Therefore, understanding of this transmitting of how volatilities and correlations between asset returns change over time whether positively or negatively is very important for both national and international investors to diversify their portfolios and hedge themselves against the unfavorable risks. Syed Faiq et.al (2015) have mentioned that the MGARCH-DCC is the appropriate model because it enables us to determine the nature of the shocks to the volatilities whether are substitutes or

complements and it pinpoints the changes between the financial variables in the different markets. However, in this study we employ the Pesaran and Pesaran (2009) MGARCH model as adopted by (Nazrol Kamil, 2012). Hence the using the Microfit, we compute the conditional cross-asset correlation as follows:

$$\tilde{\rho}_{ij,t-1}(\phi) = \frac{q_{ij,t-1}}{\sqrt{q_{ii,t-1}q_{jj,t-1}}} \quad \text{.........} \quad (1)$$

Where the $q_{ij,t-1}$ in equation one is given by the next equation 2.

$$q_{ij,t-1} = \bar{\rho}_{ij}(1 - \phi_1 - \phi_2) + \phi_1 q_{ij,t-2} + \phi_2 \tilde{r}_{i,t-1}\tilde{r}_{j,t-1} \quad \text{.........} \quad (2)$$

Where $\bar{\rho}_{ij}$ is the $(i, j)^{th}$ unconditional; and Φ_1 *and* Φ_2 are parameters in which Φ_1 *and* $\Phi_2 < 1$, and $\bar{r}_{i,t-1}$ the standardized indices returns.

In addition to the above mentioned advantages, the DCC approach allows asymmetries and time variation in both the mean and variance equation[2]. Meanwhile, we take the assumption based on the (Pesaran and Pesaran (2009); Chapter 20) that returns are normally distributed and therefore, consider the t-distribution return. However, the DCC model that captures the dynamics of time varying conditional correlation Γ_t were reported by (Masih A. M., 2016) as proposed by Engle(2002) and Tse and Tsui(2002) as in equation (3) below. The DCC model scalar parameters θ_1 and θ_2 captures the effects of previous shocks and conditional correlations on the current DCC.

$$\Gamma_t = (1 - \theta_1 - \theta_2)\Gamma + \theta_1 \,{}^{\text{Ŋ}}_{t-1}{}^{\text{Ŋ}}_{t-1} + \theta_2 \Gamma_{t-1} \quad \text{.........} \quad (3)$$

[2] - This information has been mentioned and retrieved from SH-Khabir's Notes, Advanced Econometrics tutorial.

5.2.2. Markov Switching Autoregressive Model

Together with the MGARCH-DCC, in this paper, we employ the Markov of switching autoregressive model (MSARM) for the FTEM which has recently gone under the new Shariah screening revision. The reason we incorporated this model is because it is the only model that can provide us with the accurate information of the stable and volatile regimes together with their probabilities. Therefore, we use the two-stage MSAR that has been developed by Hamilton (1989) as (Heriqbaldi, 2012) as depicted bellow in equation (3) and we formulate our univariate model for FTEM with reference to the latter Univariate model for EMPI as follows in equation (4).

$$Y_t = \mu S_t + [\sum_{i=1}^{4} \alpha i(Y_{t-i} - \mu(S_{t-i})] + \mu_t \quad \ldots\ldots (4)$$

Where: $\mu_{t/S_t} \sim NID(0, \delta^2)$ and $S_t = 1, 2$. Hence based on (Heriqbaldi, 2012) the changes between the regimes occurs in the mean parameter, μ. For reasons of brevity and space, we excluded the Markovian transition matric P and probability equations that can be found in (Heriqbaldi, 2012) and we included the equation of the regime switching univariate model of FTEM as presented below in equation (4) that may confirm the presence of non-linearity in FTEM.

$$FTEM_t = \alpha_0 S_t + \sum_{i=1}^{p} \alpha i FTEM_{t-i} + \varepsilon_t \quad \ldots\ldots (5)$$

Where: $\varepsilon_t \sim IID(0, \delta^2 (s_t))$. In nut shell, the purpose of running the MSARM is to identify both the stable and volatile regimes of FTEM.

6. Empirical Results Discussions

In this study, the main index is the FTSE Bursa Malaysia EMAS Shariah index returns as the main principal which represents the overall Malaysian Sariah compliant stock indices returns in the Malaysian equity market. Meanwhile, all the indices returns were calculated using the logarithmic

daily closing prices by { $\ln(P_t)$-$\ln(P_{t-1})$} in which P is the index value. However, as we observe the in the descriptive statistics Table 2. below, while FTHJ and FTEM have shown the highest standard deviation respectively, DJIA turned out be the least volatile index of all which is a clear indication of absolute returns of the returns volatility. With regards to the concentration of data around the mean of the distribution the Kurtosis result is shown values which are less than 3 which sparingly indicates a normal distribution and thereby of having low risks. Meanwhile, concerning the asymmetry property of the data distribution while 3 has negatively skewed the DJIE and DJID indices have shown a positive Kewness indicating the nonsymmetrical property of high variability and risk. Moreover, FSAS has revealed a zero result and the Jarque-Bera results did not reported from the excel analysis descriptive toolkits. Finally, the reported descriptive statistics is of the original data of the indices as the differenced returns cannot produce the descriptive statistics because of the negative values.

Table 2. Descriptive Statistics

	FTEM	*FTHJ*	*FSAS*	*DJIE*	*DJID*	*DJIA*
Mean	12655.45	13858.37	5428.78	2092.10	1417.53	1438.03
Standard Error	40.11	47.88	12.60	3.89	5.76	2.64
Median	12923.69	13959.14	5437.12	2086.49	1357.36	1440.87
Mode	9134.63	10007.92	5070.97	2098.38	1043.36	1253.10
Standard Deviation	1586.69	1894.08	498.38	153.95	227.81	104.50
Sample Variance	2517570.25	3587551.00	248385.82	23699.95	51899.08	10919.96
Kurtosis	-0.52	-0.91	-0.93	-0.23	-1.33	-0.65
Skewness	-0.54	-0.28	0.00	0.16	0.12	-0.04
Range	6391.55	7609.73	2228.12	814.42	810.43	525.26
Minimum	8902.98	9620.20	4343.89	1694.44	992.46	1170.62
Maximum	15294.53	17229.93	6572.01	2508.86	1802.89	1695.88

	19805780.8	21688342.4	8496044.0	3274132.7	2218428.9	2250518.3
Sum	7	7	8	3	9	2
Count	1565	1565	1565	1565	1565	1565

6.1. MGARCH - DCC Result Discussions

Before we analysis the MGARCH- DCC model, the first step is to compare the Gausian DCC model and the t-DCC model to identify the relatively more significant model as stated by (Masih A. M., 2016). Hence, the panel below in (Table 3) summarizes the Gaussian DCC model maximum likelihood estimates for the returns on the 6 Shariah compliant indices returns as well as the λ_{1i} and λ_{2i} . Furthermore, the volatility parameters are highly significant and the estimates of $\lambda_{1i,}$ i = 1, 2, 3,4,5,6 are close to unity which is a good indication of volatility decay. However, the estimated conditional correlation and volatilities are reported in Table 5. Meanwhile, Table 4.below presents the results of the t-DCC model maximum likelihood estimates of the Shariah complaint indices returns. Similar to the Gausian DCC model, the t-DCC model volatility estimates are statistically significant and near to unity reflecting the gradual decay in the volatility under the t-DCC model.

Table 3. Maximum likelihood estimates of the Gausian DCC Model on daily retuns of stock indices

Parameter	Estimate	Standard Error	T-Ratio	[Prob]
lambda1_FTEM	0.87719	0.016494	53.183	[.000]
lambda1_FTHJ	0.89009	0.016228	54.8491	[.000]
lambda1_FSAS	0.88159	0.014272	61.7724	[.000]
lambda1_DJIE	0.83706	0.01732	48.3284	[.000]
lambda1_DJID	0.84214	0.019858	42.4085	[.000]
lambda1_DJIA	0.88833	0.012982	68.4278	[.000]
lambda2_FTEM	0.068809	0.0081105	8.4839	[.000]
lambda2_FTHJ	0.058995	0.0078373	7.5274	[.000]
lambda2_FSAS	0.08082	0.0090503	8.9301	[.000]
lambda2_DJIE	0.11437	0.010483	10.9104	[.000]
lambda2_DJID	0.12348	0.014547	8.4888	[.000]
lambda2_DJIA	0.0772	0.0081278	9.4983	[.000]
delta1	0.92683	0.0068194	135.9119	[.000]
delta2	0.02554	0.0020037	12.746	[.000]
Maximized Log-Likelihood =	35200.7			

Table 4. Maximum likelihood estimates of t-DCC Model on daily retuns of stock indices

Parameter	Estimate	Standard Error	T-Ratio	[Prob]
lambda1_FTEM	0.87743	0.019879	44.1377	[.000]
lambda1_FTHJ	0.88436	0.020763	42.5927	[.000]
lambda1_FSAS	0.89487	0.015865	56.4061	[.000]
lambda1_DJIE	0.87562	0.021481	40.7625	[.000]
lambda1_DJID	0.87168	0.020527	42.4654	[.000]
lambda1_DJIA	0.89811	0.015595	57.5903	[.000]
lambda2_FTEM	0.074018	0.010246	7.2242	[.000]
lambda2_FTHJ	0.063357	0.009775	6.4816	[.000]
lambda2_FSAS	0.065142	0.0089926	7.2439	[.000]
lambda2_DJIE	0.079788	0.011754	6.7883	[.000]
lambda2_DJID	0.094945	0.014353	6.6149	[.000]
lambda2_DJIA	0.063834	0.0084226	7.579	[.000]
delta1	0.88807	0.02741	32.3992	[.000]
delta2	0.027472	0.0032265	8.5146	[.000]
df	8.9222	0.63159	14.1265	[.000]
Maximized Log-Likelihood =	35455.4			

Meanwhile, the maximized log-likelihood of the t-DCC is 35455.4 compared to the 35200.7 of the Gausian DCC and its degree of freedom as well is below 30 which clearly suggests that t-DCC as the appropriate model. Hence, by choosing the t-DCC follow our further discussions by referring to Table 4. As we can observe from Table 4 all the volatility parameters are highly significant which shows the gradual decay of the volatilities confirming the elimination of the risks after the exerted shocks in the market. More importantly, for instance, the summation of the lambda1_FTEM and lambda2_FTEM (0.87743+0.074018 = 0.951448) and the rest of indices which are less than unity conveys the information that the volatilities of these indices do not follow the IGARCH and therefore are not permanent (Masih A. M., 2016). Nevertheless, the implication of such phenomena is that according to Kabir et.al (2013) as documented by the former, despite the short run benefits of high profits, in the long-run both investors and fund managers may incur huge loss besides the speculative attaches which may only be avoided by investing in the Islamic equities.

Table 5. Unconditional Correlation and Volatilites

	FTEM	FTHJ	FSAS	DJIE	DJID	DJIA
FTEM	**0.0089557**	0.96665	0.5757	0.6372	0.318	0.65331
FTHJ	0.96665	**0.008896**	0.54201	0.6062	0.31136	0.6165
FSAS	0.5757	0.54201	**0.0098782**	0.69193	0.38863	0.91674
DJIE	0.6372	0.6062	0.69193	**0.0098553**	0.6517	0.82775
DJID	0.318	0.31136	0.38863	0.6517	**0.009092**	0.49839
DJIA	0.65331	0.6165	0.91674	0.82775	0.49839	**0.0091426**

Table 6. Unconditional Correlation and Volatilites

	FTEM	FTHJ	FSAS	DJIE	DJID	DJIA
FTEM	**0.0089557**	0.96665	0.5757	0.6372	0.318	0.65331
FTHJ	0.96665	**0.008896**	0.54201	0.6062	0.31136	0.6165
FSAS	0.5757	0.54201	**0.0098782**	0.69193	0.38863	0.91674
DJIE	0.6372	0.6062	0.69193	**0.0098553**	0.6517	0.82775
DJID	0.318	0.31136	0.38863	0.6517	**0.009092**	0.49839
DJIA	0.65331	0.6165	0.91674	0.82775	0.49839	**0.0091426**

Table 7. Ranks of the unconditional Volatilities of the six Shariah indices returns

No.	Indices	Unconditional Volatility
1	FTSE BURSA MALAYSIA EMAS $ - PRICE INDEX	0.0089557
2	FTSE BURSA MALAYSIA HIJRAH SHARIAH $ - PRICE INDI	0.0088958
3	DJ ISLAMIC WORLD DEVELOPED - PRICE INDEX	0.0090921
4	DJ ISLAMIC ASIA/PACIFIC - PRICE INDEX	0.0091426
5	DJ ISLAMIC WORLD EMERGING MKTS. - PRICE INDEX	0.0098553
6	FTSE SGX ASIA SHARIAH 100 - PRICE INDEX	0.0098782

The on-diagonal results on Table 6 above shows the unconditional volatilities of the indices. Hence, while the lower unconditional volatilities near the zero implies the least volatility of the index, on the contrast those near to unity illustrates the higher volatility levels. Nevertheless, for an easier observation, we have ranked all the 6 indices returns on the following Table 7, which clearly shows the very low conditional volatilities that range from 0.0089557 to 0.0098782. These

low levels are simply reveals the lower volatility of all the shariah indices returns under this study. Furthermore, we notice that FTSE Bursa Malaysia EMAS is relatively the lowest in terms of volatility compared to all of the remaining indices returns. This low volatility of FTEM was attributed to the developed Islamic capital market and the low amount of leverage according to (Kabir et.al (2013) and (Masih A. M., 2016)). Moreover, this could be due to the impact of the revised Shariah screening methodology and the good perception of the investors and fund managers in investing in this index.

However, with regards to the off-diagonal unconditional correlations as shown in Table 6, we observe that the correlations between FTEM Sariah index returns and FTHJ Bursa Malaysia is almost highly correlated of 0.96665; followed by FSAS and DJIA of 0.91674 and DJIA and DJIA of 0.82775. Meanwhile, FTEM has the lowest correlation with DJID of 0.318, and at the same time DJID is relatively showing the medium correlation associations with all the indices returns as well. These high positive correlations between the indices returns is reasonable and could be illustrated as follows: First, in the case of FTEM and FTHJ is due to the incorporation of the FTEM the 30 constituents of FTHJ index[3]. Therefore, it is advisable for the Malaysian investors to choose either of them for the benefit of their portfolio diversification.

Second, for the case of FSAS and DJIA is not a surprise as the FSAS index returns reflects the Asian Pacific Shariah complaint companies stocks. It is clearly stated in the report of FTSE on the 29th, February, 2016, that from the 100 companies, 50 are of the largest Japanese companies whereas the other 50 are as well large companies from Singapore, Taiwan, Korea and Hong Kong. Therefore, such a correlation is expected and therefore either of them is good to be considered for

[3] - FTSE Factsheet report, 29th February, 2016.

portfolio diversification and not both. Third, with regards to the low correlation between FTEM and DJIA, it also makes an economic sense and in agreements with the findings of (Masih A. M., 2016).

Moreover, the DJID measure components is from the US which is not a major trade partner as the rest of Asia Pacific. Finally, the medium correlations of DJID with the rest of the indices returns except FTEM and FTHJ reflects the realities of the economic facts in terms of trade volume and capital market developments. Therefore, there is good chances of portfolio diversification for Malaysia investors to invest in the DJID index compared to the rest of the indicators.

Giving our results above, we proceed analyzing the time varying properties in the volatilities and correlations using the dynamic conditional correlations for the whole period and the period after the announcement of the revision of the Shariah screening methodology in the case of Malaysia to investigate whether the newly introduced criteria made the index i.e. FTEM complement or substitute as well as examine the possibility of the shariah screening methodologies harmonization; the long debated unsettled issue to both the shariah scholars and Islamic finance practitioners alike.

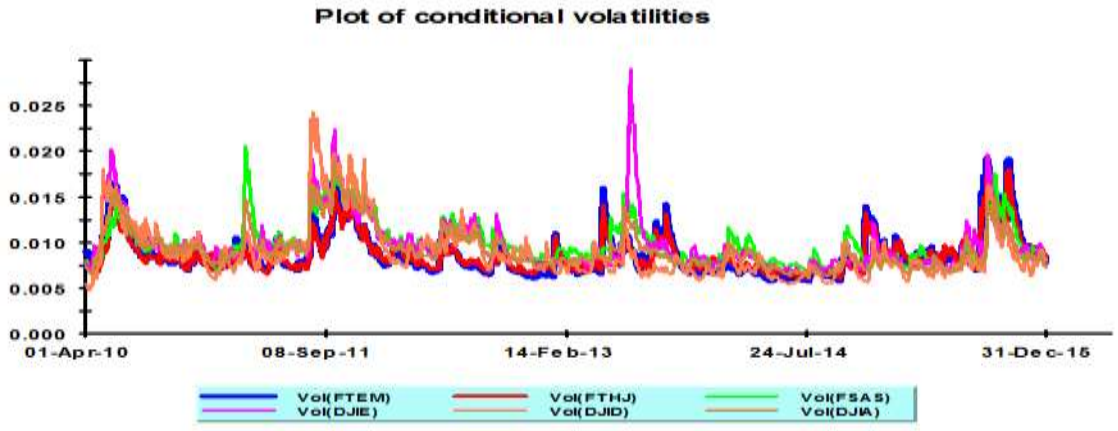

Figure 1. Conditional Volatilities- FTEM, FTHJ, FSAS, DJIE, DJID, DJIA

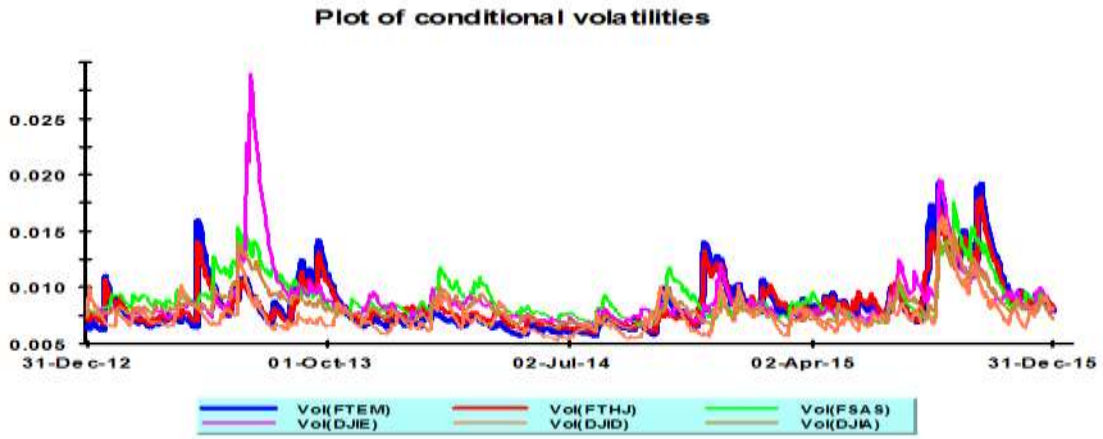

Figure 2. Conditional Volatilities- FTEM, FTHJ, FSAS, DJIE, DJID, DJIA

Figure 1 and 2, both tell us the same information, however, we added Figure 2 to identify more clearly the impact of the newly introduced revision of the Malaysian Shariah screening methodology. However, the conditional volatilities of the all indices returns move almost simultaneously with the exception of the years 2010, 2011, 2013 and 2015 and the extremely high volatility of DJIE in 2013. The reason of the smooth following of the indices returns is due the arbitrage activities that occurs because of the presence of mispricing between markets and indices prices as well as due to the emerging markets contingencies. However, major events such those that had occurred in the above mentioned years shows the persistent high volatility impacts in all of the indices returns. For instance, the high volatilities in 2010 was due to the Federal Reserve announcement of QE2 and the European debt crises. However, while the 2011 event might be due to the incidents of the tsunami and earthquake as mentioned by (Masih A. M., 2016), the 2013 event is the turmoil in the emerging markets that made stocks, bonds and currencies extremely volatile[4]. Finally, the 2015 high volatilities on the indices returns could be attributed to the current oil price crisis. Nonetheless, with regards to FTEM in Figure 2, the volatility patter show the same

[4] - Source: http:// money.CNN.com

as the results of the two recent studies that have shown the low volatility of it. Hence, the result of this paper which includes the period of the revision of the Shariah screening methodology by SAC. Therefore, though it is true that there is quite marginal volatilities, the change might be huge when it comes to portfolio diversification.

However, in order to examine the portfolio diversification of these indices returns, we plot the conditional correlation as in Figure 3 & 4 as shown below. In both Figure 3 &4, the correlations

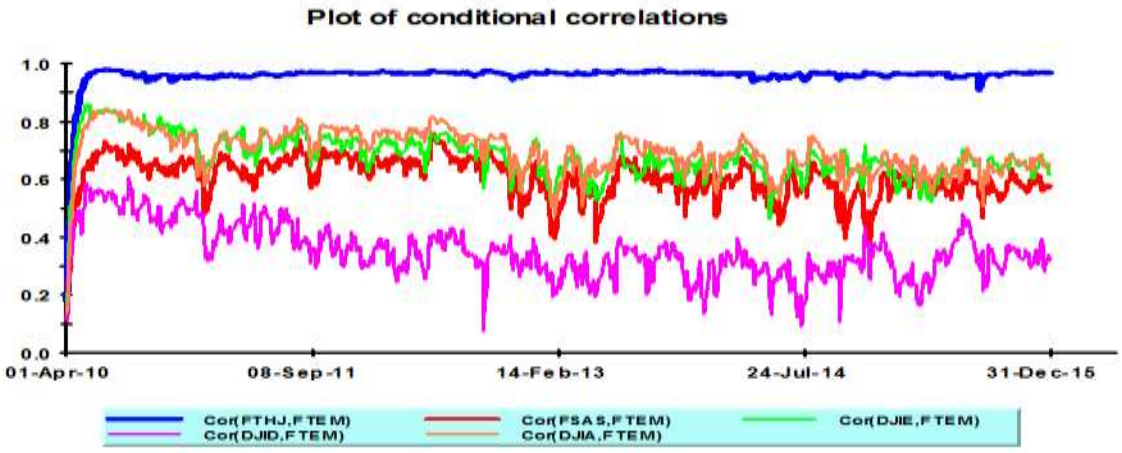

Figure 3. Conditional Correlations of FTEM with FTHJ, FSAS, DJIE, DJID, DJIA

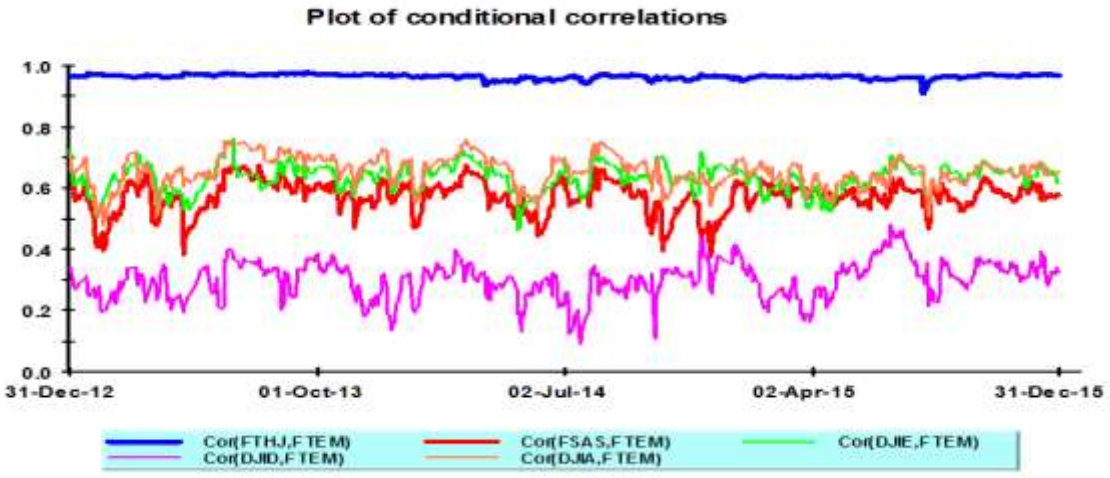

Figure 4. Conditional Correlations of FTEM with FTHJ, FSAS, DJIE, DJID, DJIA

graphs show the high correlation between FTEM and FTHJ, and the low correlation of DJID, in addition to close movements of the remaining indices returns which as well confirms and is consistent with the results of the unconditional correlations in Table 6. Hence, once again, the effect of the new revision of the shariah screening methodology neither evident in volatilities nor in correlation. Therefore, we can conclude that what is known as the Shariah risk in Islamic finance is not of much concern as long as Islamic indices could easily be adjusted to comply with Shariah.

6.2. Markov Switching Result discussions

It is clear that from the analysis of the MGARCH-DCC above, though we have obtained the information with regards to correlations and volatilities, it is still not known how far and to what extent FTEM is volatile and stable after the newly introduced Shariah screening methodology. Therefore, to answer this we run the univaraite Markov switching analysis. Therefore, the period of the study using this technique could be divide into 2 regimes for which the system can provide us with the expected probabilities and duration. For our analysis, we consider regime 1 to be the stable regime where regime 2 to be the volatile regime. Table 8 summarizes the MS model results.

Table 8. Regression results: MSFTEM specification

	Cofficient	Z-Value	Prob
Regime-dependent intercepts			
C(0)	-0.013147	-2.577389	0.0100
C(1)	0.007938	1.921183	0.0547
Autoregressive coefficients			
AR-1	0.032088	0.318082	0.7504
AR-2	-0.064436	-0.671579	0.5019
AR-3	-0.067572	-0.704412	0.4812
AR-4	-0.053634	-0.563683	0.5730
P_{0/0}	4.173984	2.881643	0.0040
P_{0/1}	-4.309664	-3.150824	0.0016

According to (Chaker Aloui, 2015) the MSAR model has been used extensively on the financial markets to capture the regime shift behavior and the time varying correlations between the financial time series during the different states of markets. Furthermore, as documented in the same paper, Hamilton and susmel (1994) as well have asserted the appropriateness of the MS model for the low frequency data weekly or monthly. Thus, for this study, we have used weekly data to be consistent with the provided theory. Moreover, the determination of the stable and the volatile regimes is decided based on the mean and variance of the regimes. Hence, regimes with the higher mean and low variances are the stable ones where the vise versa is the volatile regime. Nonetheless, from Table 8, based on the means, the first regime C (0) is the volatile regime whereas the second regime C (1) is the stable regime. Meanwhile, while the positive autoregressive coefficient estimates indicates the appropriate specification of the autoregressive model in examining the behavior of the FTEM. Hence, in the results of the model only AR-1 is positive but not statistically significant.

Nonetheless, we proceed with the interpretations of the estimated transition probabilities as presented in the matrix *P* as shown below: we can observe from the results of the estimated transition probabilities as in the matrix *P* results that neither of the regimes is stable or permanent.

$$P = \begin{bmatrix} 0.985 & \square & 0.015 \\ \square & \square & \square \\ 0.013 & \square & 0.987 \end{bmatrix}$$

Interestingly, the probability of staying in the two regimes i.e. the stable and volatile regimes is almost the same approximately 99 %. Therefore, it is not possible for one to give a conclusive explanation based on the results of the probability matrix. Hence, for more information, we have run the expected duration and plotted the smoothed regime probabilities as in figure 5 below to

examine further the results of the probabilities and to draw the conclusion on the results. Surprisingly, the expected duration of the stable regime, i.e. the probability of staying in regime 1 is turns out to be 66 weeks whereas the probability of staying in regime 2 is 75 weeks as it clearly evident in figure 5.

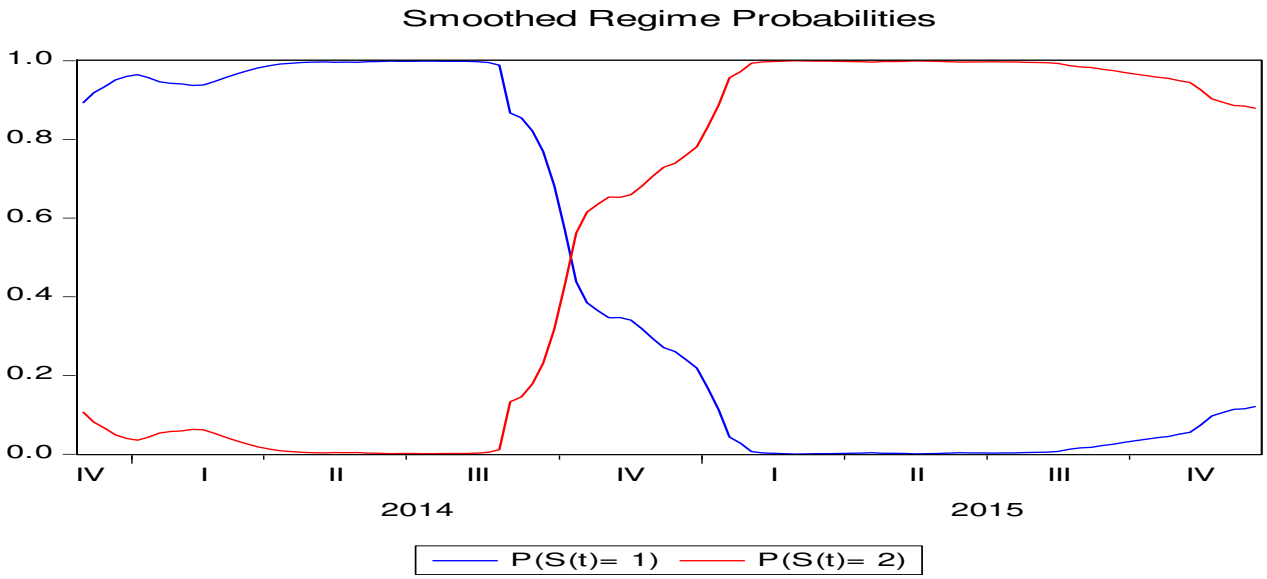

Figure 5. Smoothed regimes probability graphs.

The expected duration together with the smoothed regime graphs conveys an important information that the expected duration of the shifts between the stable regime and the volatile regime is only about 9 weeks. This is intuitive that the shift between the regimes takes 2 months, and the period of staying in each is quite long, approximately 1 year and 3 months, and 1 and 7 months for regime 1 and 2 respectively. We can also understand from graphs above in Figure 5, the Shariah risk transmission impacts is not immediate as it is shown in the case of the newly revised Shariah screening methodology by the Malaysian SAC. Therefore, giving the flexibility in the investment holding period, investors and fund managers may safely adjust their portfolio diversification strategies. In this stance, our result is in consistency with the performance report of

the returns of FTEM and FTHJ[5] in which the returns FTEM index has been declining compared to the FTHJ since the announcement of the implementation of the Shariah screening methodology.

7. Conclusions and Policy implications

The purpose of this study is to investigate the impact of the newly introduced revision of the Shariah screening methodology for the case study of Malaysia from the view point of portfolio diversification and the persistence of the Shariah risk that originates from the implementation of the new screening criteria. We have collected daily data from 01/01/2010 to 31/12/ 2015 for 6 indices returns of FTSE Islamic (FTEM, FTHJ & FSAS) and Dow Jones Islamic (DJIE, DJID & DJIA) as well as a weekly data for FTEM from 05/11/2013 to 22/12/2015, and we employed the MGARCH-DCC and the Markov switching AR techniques. The findings of this study have shown on an average a very low benefit of portfolio diversification for the Malaysian investors except for the DJID. This is due to the regional trade partnership and the contingency among the emerging capital markets particularly in Asia. Nevertheless, the implementation of the new Shariah screening methodology so far does not have any significant effect on the risk-returns of FTEM consistent with the findings of Masih et al (2016). However, the findings of this study may provide some insights to both the investors and the policy makers. For the investors, they may only consider investing in DJID due to low correlation but also better consider other Islamic indices to gain better portfolio diversification. With regards to policy makers it may give an empirical feedback for the newly implemented criteria which could assist on the decision of harmonization of methodologies.

[5] - FTSE group factsheet performance report as of 29th February, 2016.

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