Effects of Political Turmoil (Arab Spring) on Portfolio Diversification Benefits: Perspectives of the Moroccan Islamic Stock investors

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Effects of Political Turmoil (Arab Spring) on Portfolio Diversification Benefits: Perspectives of the Moroccan Islamic Stock investors

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ABSTRACT

This study makes the initial attempt to investigate the time varying volatility and return linkages of Moroccan Islamic stock indices with the market and regional based indices especially during times of political unrest. More specifically, we use the Dow Jones Islamic Developed markets and Emerging markets indices to represent the market based indices, whereas Dow Jones Islamic Europe and Dow Jones Islamic Asia Pacific were used to represent regional based indices. In an attempt to unravel the time-varying nature of these co-movements, the MGARCH-DCC which is one of the recent research methodologies was adopted and applied on daily data covering from June 2007 to December 2012. From the discovered results, it is seen that the Moroccan Islamic investors may derive benefits from portfolio diversification across stock markets of Developed markets and the Asia Pacific market especially during times when there is no political unrest. The findings obtained under this study are crucial for understanding the role of political uncertainty on the stability of the stock market and is of great interest to investors especially the Islamic ones.

Keywords: Islamic stock indices, Arab Springs, Multivariate GARCH-DCC, Opportunities for portfolio diversification

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1.0 Introduction

The Arab Spring was initiated when a young vegetable vendor in a small town in Tunisia set himself on fire as a sign of protest towards the alleged police corruption and ill treatment which happened on December 18th 2010. A revolutionary wave was triggered firstly in Tunisia and spread to other Arab countries especially in North Africa such as Morocco, Libya and Egypt. Such protests had the objective to demand reforms and have led to varying degrees of political changes with the rulers being forced out of power in some countries along with changes in domestic and foreign policies of the government. Major political events like this has a huge probability to affect the volatilities of the stock market owing to its social and economic implications(Chau et. al 2014).

With respect to the nation of Morocco, there were definitely some uprisings that happened as the revolutionary wave hit the nation such as the protests which happened in February 2011 when rallies calling for a change in constitution were taken to the streets (Masetti et. al 2014). But however, there were some statements saying that Morocco managed to avoid the situation from getting worse. Such statements were made on the basis that Islamist Justice and Development Party (PJD) had been an opposition party which is recognized in the years before its rise to power in the November 2011 elections and the PJD pursued a measured and gentle approach to push the king for reforms; which did not cause instability or invite a harsh response from the regime by showing willingness to meet the king by accepting the concessions given by him despite the fact that some protesters demanded total regime change. This is in stark contrast to the Islamist parties that came to power during the Arab Spring protests in Egypt, Tunisia and Libya (Tawill 2013).

If the political unrest was managed to be handled from going to higher levels, then the volatility and performance of the stock market would be really affected but not in a bad way. Furthermore, how are the Moroccan investors, particularly the Islamic investors are going to gain benefits of portfolio diversification from investing in other market-based and region-based indices during such political events? Is it better for them to invest in Islamic emerging or Islamic developed markets under the market based perspective ? Does it make any difference if Moroccan investors were to invest in Islamic regional indices such as, in Europe or Asia Pacific? So in order to address such questions, a study needs to be carried out to investigate the volatilities of the Moroccan Islamic index returns together with the portfolio diversification benefits it gives to its

investors when investing in other markets. Therefore, a Multivariate generalized auto regressive conditional heteroskeastic(GARCH) with dynamic conditional correlations is adopted in this study in an attempt to investigate this matter throughout the period from June 2007 to December 2012.

The structure of this paper includes five chapters which are organised as follows. This current chapter explains the introduction together with the issues motivating the study, chapter two discusses about the main objective of this paper followed by chapter 3 that gives an overview of the theoretical framework related to the issues in this paper and then chapter 4 that reviews the related previous empirical literature. Chapter 5 elaborates on the methodology applied while chapter 6 discusses the empirical findings and interprets the results. Chapter 7 gives a summary about the paper and discusses about the policy implications that can be derived from the results, respectively. Lastly, chapter 8 talks about the limitations of the study and suggestions for further research.

2.0 Objective of study

Relating to the introduction part of this paper, it is now clear that the main objective of this paper is to study to what extent do the Moroccan Islamic investors particularly in MSCI Islamic Morocco index benefit from portfolio diversification with the Islamic indices of its Islamic market-based indices (Emerging and Developed markets) and Islamic regional indices (Asia Pacific and Europe) by examining the correlations and volatilities of their market returns especially during times of political unrest.

Overall, this paper intends to contribute by filling the gap of the previous literature regarding diversification benefits between MENA markets which in this case is the Moroccan Islamic index with its market- and region-based indices by applying the recent research methodologies such as, the Multivariate GARCH DCC to see which market-based and region-based indices should Moroccan Islamic investors invest in.

Through this study of volatilities and correlations between the index returns of Moroccan Islamic index with the Islamic indices of its market- and region-based indices, it would be useful for the policy makers in Morocco if the Islamic stock indices of Morocco are found to be strongly correlated to the other indices, then there is a danger that shocks in one market may spill

over to other markets and thus, calls for stronger cooperation among the authorities of these countries (Ali et. al 2011).

3.0 Theoretical Framework

The main underlying theory of this study is the Markowitz's Modern Portfolio Theory which theory suggests a hypothesis that expected return on a portfolio for a given amount of portfolio risk is attempted to be maximized or alternately the risk on a given level of expected return is attempted to be minimized by choosing the quantities of various securities cautiously taking mainly into consideration the way in which the price of each security changes in comparison to that of every other security in the portfolio, rather than selecting securities individually.

According to the theory, each security has its own particular risk and that a portfolio of diverse securities shall be of lower risk than a single security portfolio, emphasising the importance of portfolio diversification to reduce risk.

Early on, investors stressed on individually picking high yielding stocks to earn maximum profits. So if one particular industry was offering good returns; an investor would have landed up picking all stocks of his portfolio from the same industry thereby making it a highly an irrational act of portfolio management. The main outcome of the Portfolio Theory is that the risk weight of a portfolio shall be less than the average risk weights of the securities it contains resulting optimum diversification .The Theory uses standard deviation as a substitute to risk and the variance of expected returns is expressed as follows:

$$\sigma_p^2 = \Sigma W_a^2 \sigma_a^2 + \Sigma\Sigma W_a W_b Cov_{ab}$$

Wa is the size of the portfolio in security **a**, **σa** is the standard deviation of the expected return of the security **a**, and **Covab** is the covariance of the expected returns of the securities a and b. With the assumption that the covariance is less than 1 (which is not a practical assumption), it is derived that the weighted average of the standard deviation of the expected returns of the securities shall be more. As such the theory proves that diversification of securities in a portfolio reduces risk (Portfolio Theory n.d.).

Other than that, the financial theory regarding the interest in stock market integration states that there is more efficiency in integrated regional stock markets compared to segmented national

markets. Investors belonging to a particular region will be able to allocate locations in the region where it is most productive with the existence of an integrated capital stock market according to Click and Plummer(2005). Although there are advantages coming from integrated regional stock markets, it must be noted that a long run equilibrium is exhibited by the integration among stock markets which ties prices movements in national stock indices and could considerably reduce benefits from international portfolio diversification. Even international portfolio diversification theory state that if stock markets are interlinked, the long run benefit of diversification for international investors is diminished and therefore intensifies the need for this paper to examine the dependencies among international stock markets(Ali et. al 2011).

The methodology of the M-GARCH DCC adopted in this paper has the ability to adopt a t-distribution of variances which reflects the reality more in capturing the fat tailed nature of the non-normal distributions of the index returns which overcomes the criticism in Markowitz's portfolio theory of being overly simplistic and assumes that portfolio variances are normally distributed (JP Morgan n.d.).

4.0 Literature Review

Impacts of political uncertainty has been studied by various researchers. Chau et. al (2014) studied the impact of political uncertainty caused by the civil uprisings in the Arab Spring towards the volatility of major stock markets in the Middle East and North African region and found out that the reactions of the conventional and Islamic stock market indices were heterogeneous during the recent poltical unrest. Besides that, the increase in the volatility in Islamic indices were significant during the period of political unrest whereas the conventional stock indices seem to have had little or no significant effects. A multivariate GARCH model was applied to confirm this difference in reactions and it was found to be true. In short, the notion that political uncertainty contributes to financial volatility is in line with the results obtained under this study.

As for the study done by Abou-Zaid (2011), the study investigates the volatility spillover in emerging markets by observing the international transmission of daily stock index movements from developed markets such as United States and the United Kingdom and also to emerging markets under the MENA countries which include Egypt, Israel and Turkey through the

application of the Multivariate GARCH In Mean technique. Findings of this study reveal that there is presence of a significant unidirectional return spillover from the US to Egypt and Israel but this is not the case for turkey. The British market on the other hand had no influence on any of the three MENA markets .It was also indicated that the spillover effects for Egypt and Israel were dominated by their own lag returns and own lag returns are essential indicators in signifying the the current trend and return volatilities in both markets.

By a different token, Ghini and Saidi (2014) studied the returns and volatility linkages between the Moroccan stock market with the stock markets of United States(US) and European countries by using daily data from January 2002 to December 2012 excluding holidays. The analysis on return and volatility spillover effects between Moroccan stock markets and the other markets was carried out by implementing the bivariate VAR-BEKK GARCH model . The discovery from such study shows that the recent global financial crisis led to the increase in financial linkages between Moroccan stock market and the other considered markets.

Lastly, Celik (2012) also applied the M-GARCH DCC model but not the asymmetric version of it to test the existence of financial contagion between foreign exchange markets of several emerging and developed countries during the United States subprime crisis. Findings show that there was contagion effect during the US subprime crisis for most of the developed and emerging countries but most of the effect was directed towards the emerging countries . Again, findings from this study will be of interest to international investors and portfolio managers since the level of correlations between the markets will affect the portfolio diversification benefits.

It is of no doubt that the literatures presented above have used recent methodology techniques. However, these studies have not really outlined the benefits of portfolio diversification benefits for Moroccan Islamic investors from investing in Islamic market based indices and regional based indices. So this study attempts to particularly study the portfolio diversification benefits for Moroccan Islamic investors from investing in market based indices and regional based indices together with their conditional volatilities as a result from the political uncertainty due to the Arab Spring.

5.0 Methodology

This study employs dynamic conditional correlation (DCC) method in order to estimate time dependent correlation and volatility of returns of Islamic indices which is different frpm typical diversification studies that employ constant correlation(You & Daigler 2010). In addition to DCC, this study also tested mean reversion of volatility by giving linear restrictions. Moreover, forecasting correlation of the returns over a specific period is another focus of this study.

With the DCC model, a member of the GARCH family, one can pinpoint precisely the timing and nature of plausible changes in the time series co-movement(Lee & Crowley 2004). For each time point, the DCC method gives a value that serves as the forecasted correlation between series for the next period(Lebo & Box-Steffensmeier 2008). The estimation of DCC consists two stages, which makes the estimation of a time varying correlation matrix simplified (Engle & Sheppard 2001).

In the first stage, GARCH models are applied to estimate univariate volatility parameters for each of the variables(Engle & Sheppard 2001).So if there are two variables, then 2 GARCH equations are estimated (Glosten et. al 1993). For example:

$$h_t = c_0 + a_1\varepsilon_{t-1}^2 + b_1 h_{t-1} + b_2 h_{t-2} + m_1\varepsilon_{t-1}^2 I_{\varepsilon>0}$$

(GJR, 1993 Asymmetric GARCH equation).

I is an indicator function in which it will equal to 1 when the standardized residuals of the series (ε_t) are positive and equals to 0 otherwise. If 'm' has a negative value, it can be implied that periods with negative residuals would immediately be followed by periods of higher variance compared to periods of positive residuals .

In the second stage, the inputs come from the standardized residuals from the first stage to estimate a time varying correlation matrix (Engle & Sheppard 2001). Following Engle (2002), *Ht* is a conditional covariance matrix and is:

$H_t = D_t R_t D_t$

Here:

H_t= Conditional variance matrix

D_t = Diagonal matrix of conditional time varying standardized residuals that are obtained from the univariate GARCH models (on-diagonal elements or variance or volatility component)

R_t = Time varying correlation matrix(off diagonal elements)

The log-likelihood of the above estimator can be written as:

$$L = -0.5 \sum_{t=1}^{T} (k \log(2\pi) + 2\log(|D_t|) + \log(|R_t| + \varepsilon_t' R_t^{-1} \varepsilon_t)$$

In the first step, maximisation only happens to the volatility component of D_t in which the log likelihood is reduced to the sum of the log likelihood of the univariate GARCH equations.

In the second step, the correlation component R_t is maximised with elements of (ε_t) from step 1 which gives the DCC parameters α and β(Engle 2002),

$$R_t = (1 - \alpha - \beta)\,\bar{R} + \alpha \varepsilon_{t-1} \varepsilon_{t-1}' + \beta R_{t-1} \qquad \text{(DCC equation)}$$

Over here, if $\alpha = \beta = 0$[1], then R_t is simply $\bar{R}$ and CCC model is sufficient enough. The GARCH type dynamics are contained within these models for both conditional correlation and conditional variances . Time varying conditional variances can be defined as the measure of uncertainty and thus give us insight into what causes the movement in the variance(Engle & Sheppard 2001).

The two-step estimation of the likelihood function is consistent, albeit inefficient (Engle and Sheppard, 2001). Asymmetries are allowed by the DCC, meaning that there are different weights for positive and negative shocks to a series. The asymmetries are in the variances (not in the correlations) (Cappiello, Engle and Shephard, 2003).

Conditional correlation is a forecast of the correlation that would be appropriate next period conditional on this period's data. Therefore the parameter uncertainty only causes the uncertainty in this forecast (assuming correctly specified model).

Lanza et al. (2006) also applied this technique in order to observe the dynamic conditional correlations in the daily returns on West Texas Intermediate oil forward and future prices and discovered that from 1985 to 2004, the DCC can vary dramatically in contrast to the common view that the volatility of futures price returns at different maturities are perfectly correlated. In general, the dynamic volatilities in the returns in the WTI oil forward and future prices could be either independent or interdependent over time.

The DCC estimates of the conditional correlations between the volatilities of forward and futures returns were always statistically significant which indicate that the assumption of constant conditional correlations (CCC) (between returns at different maturities) was not supported empirically since the DCC between the forward and futures returns varied dramatically The range of variation (between the max and min) was relatively narrow in the case of the dynamic volatilities of the 3-months futures returns and 6-months future returns , namely (0.832, 0.996).On a general basis, the dynamic volatilities in the returns in the WTI forward and futures prices could be either independent or interdependent over time.

In the case of DCC between forward 1-month and futures 1-month, the max is 0.998 implying that forward one month and futures one month returns would have the same risk. However, the min is -0.291 implying that shocks to either of them are not perfect substitute in terms of risk

It was assumed by Bollerslev (1990) that the conditional variance for each return, h_{it} (i=1, …, m) follows a univariate GARCH process, that is, CCC specification:

$$h_{it} = \omega_i + \sum_{j=1}^{r} a_{ij}\, \varepsilon_{i,t-j}^2 + \sum_{j=1}^{s} \beta_{ij}\, h_{i,t-j} \quad \textbf{(CCC model)}$$

The ARCH effects or short-run persistence of shocks to return j is represented by a_{ij} and β_{ij} represents the GARCH effects, or contribution of shocks to return *i* to long-run persistence.

Independence of the conditional variances across returns is assumed by the CCC specification above and asymmetric behaviour is not accommodated. Asymmetric GARCH or GJR specification for the conditional variance, which for r=s=1 was then proposed by Glosten et al. (1993) to accommodate the asymmetric impacts of positive and negative shocks which is given below:

$$h_{it} = \omega_i + \alpha_i \varepsilon_{i,t-1}^2 + \gamma_i I_{i,t-1} \varepsilon_{i,t-1}^2 + \beta_i h_{i,t-1}$$

(Asymmetric Conditional Variance Model)

I_{it} is an indicator function to distinguish between positive and negative shocks on conditional volatility.

The following DCC model was proposed by Engle (2002) and Tse and Tsui (2002) in order to capture the dynamics of time-varying conditional correlation Γt:

$$\Gamma_t = (1 - \theta_1 - \theta_2)\Gamma + \theta_1 \eta_{t-1} \eta_{t-1}^{'} + \theta_2 \Gamma_{t-1}$$

Effects of previous shocks and previous dynamic conditional correlations on current DCC are captured using the scalar parameters θ_1 and θ_2.

The reasonable flexibility in modelling individual volatilities and can be applied to portfolios with a large number of assets has made the DCC model a popular estimation procedure(Pesaran and Pesaran, 2007).

DCC model used with a multivariate t-distribution is more appropriate since it can capture fat-tailed nature of the distribution of index returns especially for risk analysis where the tail properties of return distributions are of most concern. The log-likelihood function of the DCC model can be maximized by using a two step procedures as suggested by Engle (2002). However, such procedures will no longer be applicable to such a t-DCC specification and a simultaneous approach to the estimation of the parameters of the model which includes the degrees of freedom parameter of the multivariate t distribution would be needed (Pesaran and Pesaran, 2007) .

The standardized returns used by Engle (2002) are as follows:

$$z_{it} = \frac{r_{it}}{\sigma_{i,t-1}(\lambda_i)}$$

A two step procedure is also proposed by Engle (2002) in estimating the cross asset correlations which includes:

(i) The Individual GARCH (1,1) models are fitted to the 'm' asset returns separately, and then,

(ii) The coefficient of the conditional correlations,θ , is estimated by Maximum Likelihood Estimator (MLE) (assuming that asset returns are conditionally Gaussian).

But such procedure poses drawbacks of:

i)The assumption of Gaussianity is not applicable for daily returns and the portfolio risk can be estimated by its use.

ii) There would be inefficiency in the two stage approach under the Gaussianity assumption even if it is consistent.

An alternative formulation of conditional correlations $(\rho_{ij,t-1})(\emptyset)$ is therefore proposed by Pesaran which makes use of the realised volatilities. The estimates of the correlations of Pesaran is based on the devolatized returns that are nearly Gaussian (Pesaran & Pesaran 2007).

$$\tilde{r}_{it} = \frac{r_{it}}{\sigma_{it}^{realized}} = \frac{r_{it}}{\sigma_{it}(p)}$$

For daily returns a value of p=20 tends to render $\tilde{r}_{it}$ nearly Gaussian.

Under the study done by Pesaran and Pesaran (2007) by applying the t-DCC estimation procedure towards a portfolio composed of six currency futures, four ten year government bonds and five equity index fuitures over the period 2 January 1995 to 31 December 2006 and discovered that the normal-DCC model is rejected but the t-DCC specification id favoured.

6.0 Results and Discussions

6.1 Data analysis

Under this study, the MSCI Islamic Morocco Index returns is used as a proxy for the Moroccan Islamic stock index returns. The first objective which is comparing which market based indices gives better potfolio diversification benefits towards Moroccan Islamic investors, includes the Dow Jones Developed Markets and the Dow Jones Islamic Emerging Markets indices. As for the second research objective focuses on regional based indices, we make use of the Dow Jones

Islamic Europe and Dow Jones Islamic Asia Pacific.When carrying out tests for robustness we further used Dow Jones Islamic USA to represent the Dow Jones Islamic Developed markets whereas the MSCI Islamic Taiwan index used to represent the Dow Jone Islamic Emerging and Asia Pacific indices since we were not able to find any Dow Jones Islamic market for Taiwan in the Data stream database. and lastly the Dow Jones Islamic United Kingdom was used to represent Dow Jones Islamic Europe .

Table 1 below lists the sample indices being considered in this study.

Symbol	Definition
MSMR	MSCI Islamic Morocco Index
DJDEV	Dow Jones Islamic Developed Markets
DJEM	Dow Jones Islamic Emerging Markets
DJAP	Dow Jones Islamic Asia-Pacific
DJEU	Dow Jones Islamic Europe
MSTWN	MSCI Islamic Taiwan Index
DJUS	Dow Jones Islamic US
DJUK	Dow Jones Islamic UK

We collected daily time series closing price data for 6indices starting from 29 June 2007 to 31 December 2012 with 1 January 2013 to 31 December 2013 designated as the forecast period All the data is obtained from Thomson-Reuters DataStream database available from the Knowledge Management Centre of INCEIF University. The stock indices returns were calculated as differences of the logarithmic daily closing prices of indices $\{ln(p_t) - ln(p_{t-1})\}$ where p is an index value.

As for descriptive Statistics in **Table 2** below indicate that the volatility represented by the standard deviation is the highest for the Dow Jones United Kingdom index returns and lowest for the MSCI Islamic Morocco index returns . This standards deviation shows absolute time independent volatility of the return.

Table 2:Descriptive Statistics

	MSTWN	MSMR	DJUS	DJUK	DJEU	DJEM	DJDEV	DJAP
Mean	-0.00002	-0.00028	0.00007	-0.00015	-0.00011	-0.00006	0.00000	-0.00005
Median	0.00000	0.00000	0.00044	0.00051	0.00064	0.00108	0.00069	0.00090
Maximum	0.06449	0.05342	0.11740	0.11676	0.11491	0.10800	0.10052	0.09691
Minimum	-0.06482	-0.08035	-0.09697	-0.09569	-0.09913	-0.09165	-0.09079	-0.09688
Std. Dev.	0.01469	0.01110	0.01504	0.01866	0.01795	0.01528	0.01426	0.01439
Skewness	-0.17265	-0.37342	-0.10280	-0.04925	0.03607	-0.42557	-0.33099	-0.45961
Kurtosis	5.41131	8.65575	11.11786	8.03695	8.44981	9.27446	12.07555	8.76983
Jarque-Bera	355.277 (0.0000)	1948.646 (0.0000)	3948.272 (0.0000)	1519.659 (0.0000)	1778.626 (0.0000)	2400.588 (0.0000)	4957.881 (0.0000)	2043.89 (0.0000)

Findings show that all returns are negatively skewed except for the returns of the Dow Jones Islamic Europe index returns, indicating that the returns for this index are not symmetric leading to higher variability and risk. Kurtosis values for all returns are all more than 3 indicating that the returns in the Islamic indices are not normally distributed and therefore has higher risks. For the Jarque Bera test results, all returns are significant meaning that the non-normality, variability and higher risk of the returns of the Islamic indices is further strengthened(Kabir et. al 2013).

6.2 Results and Discussions

6.2.1 Should Moroccan Islamic stock market investors invest in Islamic emerging or developed markets to gain portfolio diversification benefits.

Under this section, comparison of Gaussian DCC Model and the t-DCC model is done together with plotting the estimated conditional volatilities and correlations and finally testing for their linear restrictions. The comparison between the Gaussian DCC Model and the t-DCC model serves as a preliminary step to determine which model is relatively more significant.

Since we are primarily interested in volatility modelling and correlations between these indices, we set $\mu_{t-1} = 0$, and estimate the DCC models on the Shari'ah compliant indices daily retuens over the period of 29 June 2007 to 31 December 2012. The case of non-convergence was not encountered and furthermore the Maximum Likelihood estimates of the Gaussian DCC and t-DCC models on stock indices daily returns was obtained under this section.

Table 3: Maximum Likelihood estimates of the Gaussian DCC model on stock indices daily returns:

Parameter	Estimate	Standard Error	T-Ratio	Probability
lambda1_MSMR	0.61554	0.11174	5.50880	[.000]
lambda1_DJDEV	0.90817	0.00808	112.45470	[.000]
lambda1_DJEM	0.90232	0.01268	71.16490	[.000]
lambda2_MSMR	0.13584	0.02670	5.08740	[.000]
lambda2_DJDEV	0.08500	0.00708	12.00050	[.000]
lambda2_DJEM	0.09075	0.01110	8.17810	[.000]
delta1	0.98919	0.00231	427.38330	[.000]
delta2	0.01132	0.00174	6.51820	[.000]
Maximized Log-Likelihood	13546.3			

Table 4: Unconditional Correlation and volatilities of MSMR,DJDEV and DJEM

	MSMR	DJDEV	DJEM
MSMR	***0.01110***	0.09851	0.11476
DJDEV	0.09851	***0.01426***	0.65883
DJEM	0.11476	0.65883	***0.01528***

The upper panel of the above results of the Gaussian DCC model presents the maximum likelihood estimates for the returns on the three islamic stock index returns and λ_{1i} and . λ_{2i} The volatility parameters observed under this model are highly significant together with estimates of λ_{1i}, i= 1,2,3 are very close to unity implying a gradual volatility decay . The estimated unconditional volatilities and correlations are reported within the lower panel of the results in table 4.

After this, the ML estimates of the t-DCC model were obtained to serve as a preliminary step to determine which model is more significant for this study by referring to Table 5 in the next page.

Table 5: Maximum Likelihood estimates of t-DCC model on stock indices daily returns

Parameter	Estimate	Standard Error	T-Ratio	Probability
lambda1_MSMR	0.74527	0.06500	11.46520	[.000]
lambda1_DJDEV	0.89065	0.01599	55.68850	[.000]
lambda1_DJEM	0.90619	0.01542	58.77330	[.000]
lambda2_MSMR	0.14516	0.02886	5.02970	[.000]
lambda2_DJDEV	0.09651	0.01344	7.18320	[.000]
lambda2_DJEM	0.08307	0.01289	6.44450	[.000]
delta1	0.98054	0.00629	155.78580	[.000]
delta2	0.01480	0.00333	4.44330	[.000]
df	5.86210	0.43614	13.44100	[.000]
Maximized Log-Likelihood	13730.5			

Table 6: Unconditional Correlation and volatilities of MSME,DJDEV and DJEM

	MSMR	DJDEV	DJEM
MSMR	***0.01110***	0.09851	0.11476
DJDEV	0.09851	***0.01426***	0.65883
DJEM	0.11476	0.65883	***0.01528***

From the ML estimates of the t-DCC model on the Islamic stock indices daily returns, it could be seen that all return volatility estimates are statistically significant and near to unity implying a gradual decay in volatility under the t-DCC model. The maximized Log-Likelihood value of 13730.5 is larger than the one obtained under the Gaussian model which was 13546.3 on top of that, the estimated degrees of freedom for the t-normal distribution is below 30 and therefore all of these results suggest that the t-distribution is a more appropriate model for capturing the fat-tailed nature of the distribution of the stock returns.

Since now we have chosen the t-DCC model, we now refer to table 5 for our following discussion. From the table 5, it is observed that the volatility parameters are highly significant that indicates gradual volatility decay in which for example the riskiness involved in the returns gradually cancels out after following a shock in the market. Even after adding Lambda1_EMAS and lambda2_MSMR(0.74527 + 0.14516= 0.89043) and also the other five remaining indices, the result of the summation is still less than 1 or unity which tells us that the volatility of MSMR return together with the other returns are not following the Integrated Generalized Auto

Regressive Conditional Heteroskedascticity(IGARCH) or in other words, the shock to the volatilities are not permanent . As an implication from shocks to volatilities that are not permanent , investors and portfolio managers would have a high chance of losing their investment even if they make high profit in the short run . On the other hand, speculators would be welcoming such conditions that are favourable to their interests. From here, it can also be concluded that it is safer to invest in islamic equities regardless whether it is for muslim or non-muslim investors(Kabir et. al 2013).

Table 7: Ranks of the unconditional volatilities of the 3 Islamic indices returns

No.	Indices	Unconditional Volatility
1	MSCI Islamic Morocco Index	0.01110
2	Dow Jones Islamic Developed markets index	0.01426
3	Dow Jones Islamic Emerging markets index	0.01528

The on-diagonals in table 6 explain the unconditional volatilities of the indices. If the unconditional volatility is near to zero, it can be implied that the particular index has the least volatility whereas if the unconditional volatility is near to 1, it indicates higher volatility levels. In this study, we have ranked the three indices returns and we found out that all of them had very low unconditional volatilities ranging from 0.01110 to 0.01528 that in turn signifies on overall that the returns on the three Shari'ah compliant stock indices are less volatile. Moreover, it could be observed that the MSCI Islamic Morocco index is relatively less volatile compared to the other five Islamic stock indices. Islamic capital markets were seen to be stable during the 2008 global financial crisis that may be attributed to the low amount of leveraging which leads to lack of response in the changed happening in the mainstream stock markets which has resulted in considerable impacts on asset allocation in Islamic portfolios (Kabir et. al 2013).

With regards to the off-diagonal elements showing the unconditional correlations as presented in table 6, it is observed that correlation between Morocco Islamic stock index returns with Islamic emerging market returns with the coefficient of +0.11 is higher compared to the Developed markets returns which is +0.099. This is not much of a surprise since north African countries such as Egypt are included under the emerging markets index according to the Datastream database which can lead to stronger relations between Morocco and the emerging markets. From

here, we can say that there is more chances of diversification benefits if Moroccan Islamic investors were to include their investments in the developed markets stock markets in their portfolio as compared to the emerging market.

We now then proceed to examine the dynamic conditional correlations which capture the time-varying properties in the volatilities and the correlations. Figure 1 and 2 illustrate the results.

Figure 1:Conditional Volatilities of MSMR,DJDEV and DJEM

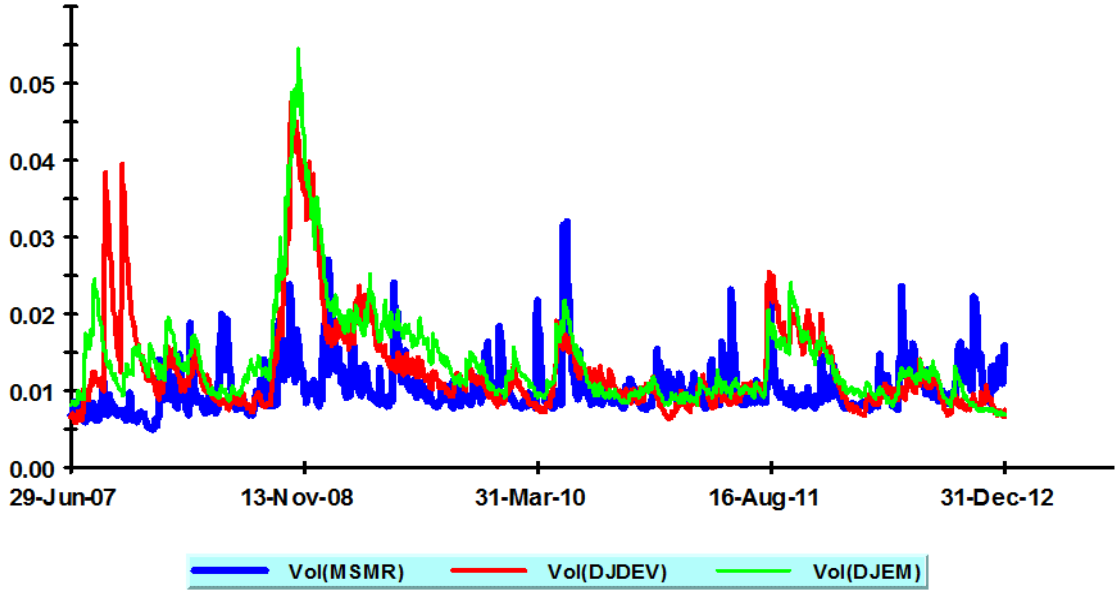
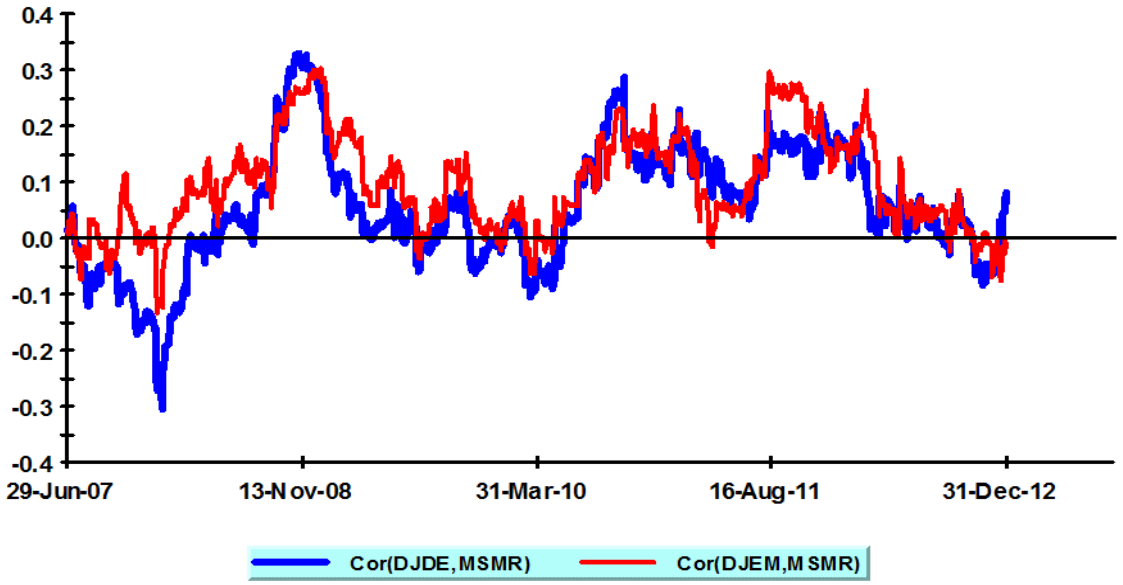


Figure 1 that illustrates the conditional volatilities of all Islamic indices returns that are found tend to move more or less simultaneously except during the 2008 global financial crisis. During the period of the global financial crisis, there seems to be a high convergence of volatility among returns of the developed and emerging markets that reflects a higher financial integration between these markets but this is not the case with the Moroccan Islamic stock index returns. Usually higher financial integration between stock returns is unfavourable for investors and portfolio managers since it would lead to less opportunities to obtain benefits from portfolio diversification(Kabir et. al 2013). Therefore, there is a low potential for diversification benefits for Moroccan Islamic investors with developed and emerging markets since Moroccan Islamic index returns do not tend to move along with these two markets in the long run except during the global financial crisis. This results confirm the ones shown in table 5. The conditional volatilities of the emerging Islamic stock market returns were also observed to be high just a few months

before the global financial crisis occurred. On the side note, there seems to be an unusual peak during June 2010 for the Moroccan Islamic stock market that is higher than other stock index that can be attributed to the after effects of the European union-Morocco summit in March 2010 which planned to strengthen relations between the two parties (Council of the European Union 2010). There were also moderate peaks in volatility around February to April 2011 that can attributed the start of the Moroccans taking it to the streets to demand a change of government and constitutional reforms, followed by protests and demonstrations in Rabat later in march 2011(Al-Jazeera 2014) and later on the occurrence the bomb attacks in a Marrakesh café in April 2011 which was Morocco's deadliest blast in the past 8 years(BBC 2013) . Moderate volatility peaks in August 2011 which can be connected to the persisting protests by Moroccans which was consequently followed by the elections by Moroccans to vote for the approval of constitutional change to curb the monarchical power (Al-jazeera 2014) .Overall, volatilities during periods of political turmoil were not that severe for morocco since it was claimed that morocco managed to dodge the effects of the arab spring(Tawill 2013). It was stated by Mekouar (2011) that All kinds of people, even the brother-in-law of the King, even very well-known people, marched in the streets, but there was no reaction from the government in terms of police actions against the demonstrators that was seen to be wise which hampered the effects of the Arab Springs in Morocco .

Figure 2:Conditional correlations of MSMR,DJDEV,DJEM



Next, we plot the conditional correlations in Figure 2 and again it consistently confirms with the results of the unconditional correlations in Table 6 showing that the Moroccan Islamic stock index returns are less correlated with returns of the developed markets for most of the time. Correlations of Moroccan stock index returns seem to be higher with the Emerging markets as compared with the Developed markets during the end of 2007 before the global financial crisis initiated Interestingly, we see that the correlations of the Emerging market and Developed market returns with the Moroccan returns are almost moving together during periods towards December 2012 , middle of 2011 and also during a few months after 31 march 2010 that can be attributed to the landslide victory scored by King Mohammed during July 2011 in a referendum on a reformed constitution he proposed to placate "Arab Spring" protests , the trade union rally that took place in Casablanca in middle of 2012 (BBC 2013) and the after effects of the European Union Morocco Summit in March 2010(Council of the European Union 2010), respectively. To add further to these statements, North African exports could be stimulated by establishing closer ties with fast-growing emerging markets. Actually, over the last decade the importance of emerging markets for the region's exports already started to increase which may explain the high correlation between Islamic Moroccan stock index and the emerging markets (Masetti et. al 2013). It can be suggested from here that Moroccan Islamic investors are better off investing in developed markets especially during times when political uncertainties are not happening to gain more portfolio diversification compared to other emerging stock markets.

Next we carried out forecasting of the conditional volatilities and correlations of the Islamic indices undertaken in this section of the study. The figures tend to show that the conditional volatility and correlations between the Islamic indices returns are likely to increase immediately after the inception of the forecasting period which starts at 1 January 2013 which gradually flattens out, signifying that the stability of the Islamic stock markets are being achieved gradually. Suprisingly for the forecast of conditional correlations, it was seen that the correlation of Moroccan markets with developed markets are higher compared to the emerging markets.

Figure 3:Forecasted conditional volatility of MSMR,DJDEV and DJEM

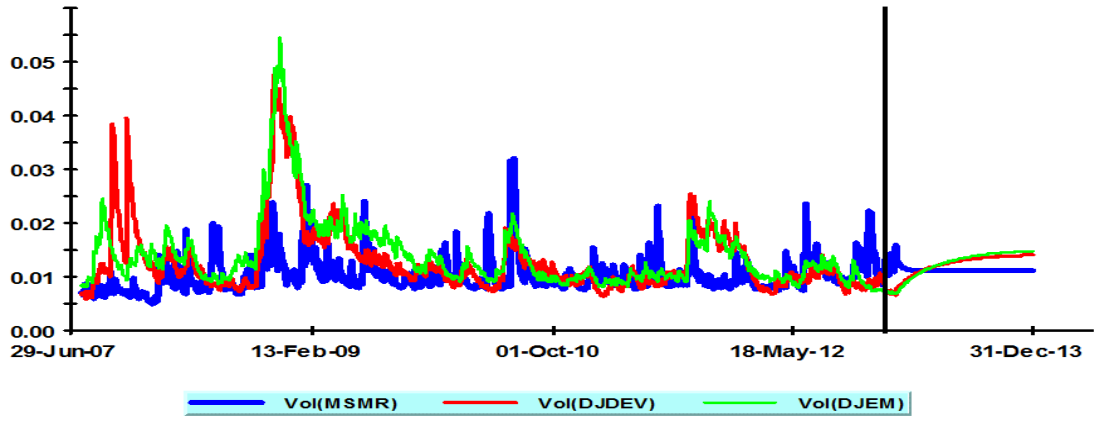
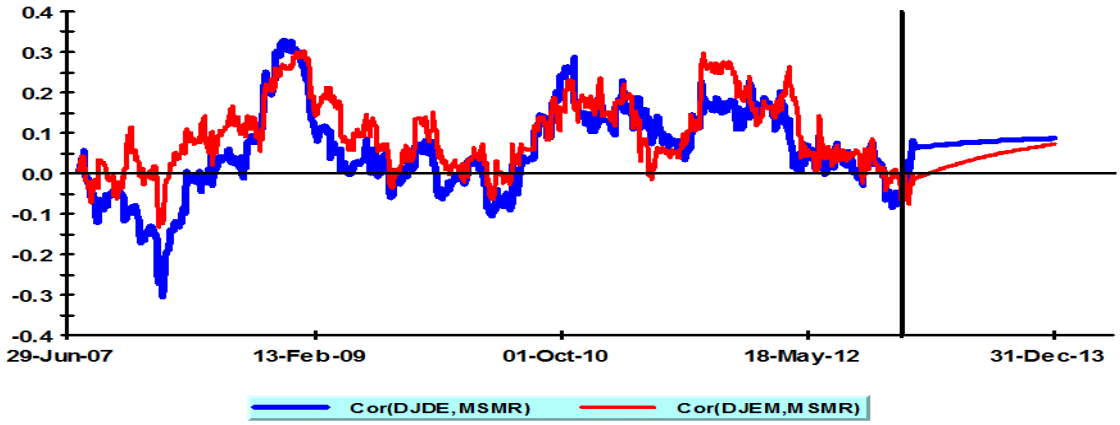


Figure 4:Forecasted conditional volatilities of MSMR,DJDEV and DJEM



It was suspected that the emerging markets were highly correlated with the emerging markets since Egypt which is a north African country located near to Morocco is listed under the Dow

Jones Islamic emerging markets index. However, by looking deeper into the Datastream database, the share of Egyptian stocks in the index is to be a mere 9.55% of the total number of component stocks. Therefore, Egyptian stocks have a limited role in affecting the correlations. Nevertheless, we found out that Taiwan is the largest constituent of the Dow Jones Islamic Emerging markets by having the largest amount of share of stocks amounting to 206 stocks.

With regards to weaker correlations between the Moroccan Islamic market returns with the Dow Jones Islamic developed markets index returns, we found that the United States is the top country by virtue of the number of stocks amounting to 42.36% share of stocks. From thereon, we decided to do robustness tests ensure that are observations were valid so again we ran the Multivariate GARCH DCC to analyse the unconditional and conditional correlations of the Moroccan Islamic stock index returns with **MSCI Islamic Taiwan index returns as a proxy to for Taiwan** under the Islamic Emerging markets index and the **Dow Jones Islamic US Index returns to represent the US** under the Dow Jones Islamic Developed markets index.

We tried to get ML estimates for the robustness test section but unfortunately there was a **problem of non- convergence** in the normal distribution. Not too worry, we still managed to obtain convergent results with the t-DCC distribution. Based on some studies carried out by JP Morgan (n.d.), there were findings showing that stock returns are not normally distributed in the real world meaning that we can rely on the t-distribution without making further comparison.

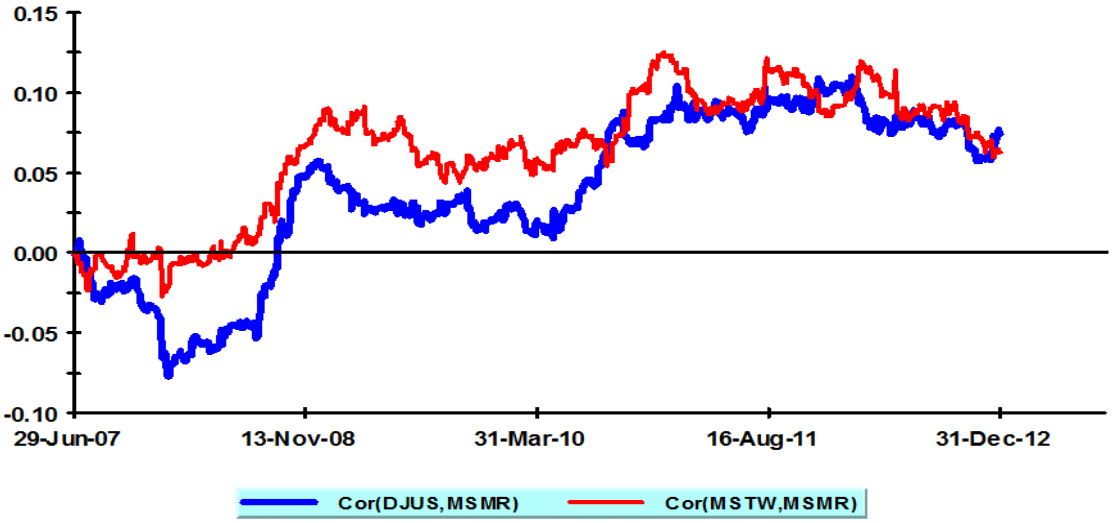
Table 8: Maximum Likelihood estimates of t-DCC model on stock indices daily returns

Parameter	Estimate	Standard Error	T-Ratio	Probability
lambda1_MSMR	0.71074	0.07776	9.14050	[.000]
lambda1_DJUS	0.89825	0.01504	59.72760	[.000]
lambda1_MSTWN	0.94016	0.01358	69.25150	[.000]
lambda2_MSMR	0.15996	0.03288	4.86470	[.000]
lambda2_DJUS	0.09215	0.01307	7.04970	[.000]
lambda2_MSTWN	0.05258	0.01105	4.75740	[.000]
delta1	0.99650	0.00286	348.92880	[.000]
delta2	0.00226	0.00137	1.64830	[.100]
df	6.50230	0.52645	12.35110	[.000]
Maximized Log-Likelihood	13143.4			

Table 9:Unconditional Volatilities and Correlations of MSMR,DJUS and MSTWN

	MSMR	DJUS	MSTWN
MSMR	***0.01110***	0.08461	0.08122
DJUS	0.08461	***0.01503***	0.15605
MSTWN	0.08122	0.15605	***0.01469***

Figure 5:Conditional Correlations- MSMR,DJUS and MSTWN



Surprisingly, the unconditional correlations in Table 9 between Morocco Islamic index returns with the US Islamic returns are higher compared with the Taiwan Islamic index returns. In contrast to this surprising findings, the conditional correlations between Morocco Islamic index returns are stronger with the Taiwan Islamic index returns compared to United States Islamic index returns which confirms with the results obtained before the robustness checks. From here, we would **rely on the conditional correlations since it is time varying and more realistic**. Therefore, it can be concluded that Moroccan Islamic index returns are less correlated with developed market returns as compared to emerging market returns and Moroccan investors are possibly better off investing in developed markets in order to gain benefits of portfolio diversification.

6.2.2 Should Moroccan Islamic stock market investors invest in Asia pacific markets or European markets to gain portfolio diversification benefits?

For the third time, a Multivariate-GARCH DCC analysis was carried out between the MSCI Islamic Morocco Index returns with the Dow Jones Islamic Asia Pacific Markets index returns and the Dow Jones Islamic European market returns. Again, comparison of Gaussian DCC Model and the t-DCC model is done together with plotting the estimated conditional volatilities and correlations and finally testing for their linear restrictions. The comparison between the Gaussian DCC Model and the t-DCC model serves as a preliminary step to determine which model is relatively more significant.

Since we are primarily interested in volatility modelling and correlations between these indices, we set $\mu_{t-1} = 0$, and estimate the DCC models on the Islamic indices daily returns over the period of 29 June 2007 to 31 December 2012. Any case of non-convergence was not encountered and furthermore the Maximum Likelihood estimates of the Gaussian DCC and t-DCC models on stock indices daily returns was obtained under this section.

Table 10:Maximum Likelihood estimates of the Gaussian DCC model on stock indices daily returns

Parameter	Estimate	Standard Error	T-Ratio	Probability
lambda1_MSMR	0.62464	0.10308	6.06010	[.000]
lambda1_DJEU	0.89957	0.01460	61.62180	[.000]
lambda1_DJAP	0.88299	0.01719	51.37380	[.000]
lambda2_MSMR	0.13326	0.02550	5.22660	[.000]
lambda2_DJEU	0.08840	0.01159	7.62740	[.000]
lambda2_DJAP	0.10731	0.01478	7.26130	[.000]
delta1	0.97643	0.01659	58.84200	[.000]
delta2	0.00622	0.00256	2.42710	[.015]
Maximized Log-Likelihood	12956.4			

Table 11:Unconditional Volatilities and Correlations of MSMR,DJEU and DJAP

	MSMR	DJEU	DJAP
MSMR	***0.01110***	0.09422	0.12340
DJEU	0.09422	***0.01794***	0.51773
DJAP	0.12340	0.51773	***0.01438***

The upper panel of the above results of the Gaussian DCC model presents the maximum likelihood estimates for the returns on the three Islamic stock index returns and λ_{1i} and . λ_{2i} The volatility parameters observed under this model are highly significant together with estimates of λ_{1i}, i= 1,2,3 are very close to unity implying a gradual volatility decay . The estimated unconditional volatilities and correlations are reported within the lower panel of the results in table 11.

After this, the ML estimates of the t-DCC model were obtained to serve as a preliminary step to determine which model is more significant for this study.

Table 12: Maximum Likelihood estimates of t-DCC model on stock indices daily returns

Parameter	Estimate	Standard Error	T-Ratio	Probability
lambda1_MSMR	0.72593	0.07282	9.96920	[.000]
lambda1_DJEU	0.91391	0.01565	58.41700	[.000]
lambda1_DJAP	0.90164	0.01728	52.17580	[.000]
lambda2_MSMR	0.15081	0.03054	4.93820	[.000]
lambda2_DJEU	0.07224	0.01203	6.00560	[.000]
lambda2_DJAP	0.08724	0.01443	6.04730	[.000]
delta1	0.97437	0.01629	59.83420	[.000]
delta2	0.00786	0.00330	2.38500	[.017]
df	7.57330	0.69088	10.96170	[.000]
Maximized Log-Likelihood	13073.4			

Table 13: Unconditional Volatilities and Correlations of MSMR,DJEU and DJAP

	MSMR	DJEU	DJAP
MSMR	***0.01110***	0.09422	0.12340
DJEU	0.09422	***0.01794***	0.51773
DJAP	0.12340	0.51773	***0.01438***

From the ML estimates of the t-DCC model on the stock indices daily returns, it could be seen that all return volatility estimates are statistically significant and near to unity implying a gradual decay in volatility under the t-DCC model. The maximized Log-Likelihood value of 13073.4 in

the t-DCC model is larger than the one obtained under the Gaussian model which was 12956.4 . On top of that, the estimated degrees of freedom for the t-normal distribution is below 30 and therefore all of these results suggest that the t-distribution is a more appropriate model for capturing the fat- tailed nature of the distribution of the stock returns.

Since now we have chosen the t-DCC model, we now refer to table 12 for our following discussion. From the table 12, it is observed that the volatility parameters are highly significant that indicates gradual volatility decay in which for example the riskiness involved in the returns gradually cancels out after following a shock in the market. Even after adding Lambda1_MSMR and lambda2_MSMR(0.72593+ 0.15081= 0.87674) and also the other 2 remaining indices, the result of the summation is still less than 1 or unity which tells us that the volatility of MSMR return together with the other returns are not following the Integrated Generalized Auto Regressive Conditional Heteroskedascticity (IGARCH) or in other words, the shock to the volatilities are not permanent. As an implication from shocks to volatilities that are not permanent, investors and portfolio managers would have a high chance of losing their investment even if they make high profit in the short run . On the other hand, speculators would be welcoming such conditions that are favourable to their interests. From here, it can also be concluded that it is safer to invest in islamic equities regardless whether it is for muslim or non-muslim investors (Kabir et. al 2013).

The on-diagonals in table 13 explain the unconditional volatilities of the indices. If the unconditional volatility is near to zero, it can be implied that the particular index has the least volatility whereas if the unconditional volatility is near to 1, it indicates higher volatility levels. In this study, we have ranked the six indices returns and we found out that all of them had very low unconditional volatilities ranging from 0.0110 to 0.01794 that in turn signifies on overall that these returns on the three Shariah compliant stock indices have are less volatile. Moreover, it could be observed that the MSCI Islamic Morocco index is relatively less volatile compared to the other returns of the Islamic European and Asia Pacific indices.

Meanwhile ,with regards to the off-diagonal elements showing the correlations as presented in table 13, it is observed that correlation between Moroccan Islamic stock market returns with Asia pacific Islamic stock market returns are higher than returns of the European Islamic indexes which is +0.1234. This is not much of a surprise since it turns out that Taiwan also happens to be

the largest constituent under the Dow Jones Islamic Asia Pacific index . As an important point, Taiwan had a higher correlation with Morocco Islamic stock index returns which was evident in the earlier analysis with the Islamic Emerging and developed markets. Weak correlations were found to be between the returns of the Moroccan Islamic stock markets with the European Islamic stock index which is +0.0942 From here, we can say that there is more chances of diversification benefits if Moroccan Islamic investors were to include European Islamic stocks in their portfolio as compared to the other Islamic stocks.

Through the conditional volatilities and correlations shown in Figure 6 and 7 , the time varying properties of the volatilities and correlations are confirmed where the conditional volatilities of the Moroccon Islamic index returns are the least volatile especially during the global financial crisis period but had higher peaks compared to the other indices after a few months when the European union-Morocco summit took place in March 2010 together with another few moderate peaks in August 2011 and a few months before December 2012 related to the political tensions arising from March 2011 to July 2011 and also towards the end of 2012 as what was stated in earlier sections.

Figure 7 confirms consistently that Morrocan Islamic stock index returns are strongly correlated with the Islamic Asia pacifc index returns so therefore, Moroccan Islamic investors can be possibly better off in European markets . But as an important point to take note, as of during the global financial crisis period, the correlations of Asia Pacific and European market returns with Moroccan returns are almost similar implying symmetric portfolio diversification benefits.

Figure 6:Conditional Volatilities of MSMR,DJEU and DJAP

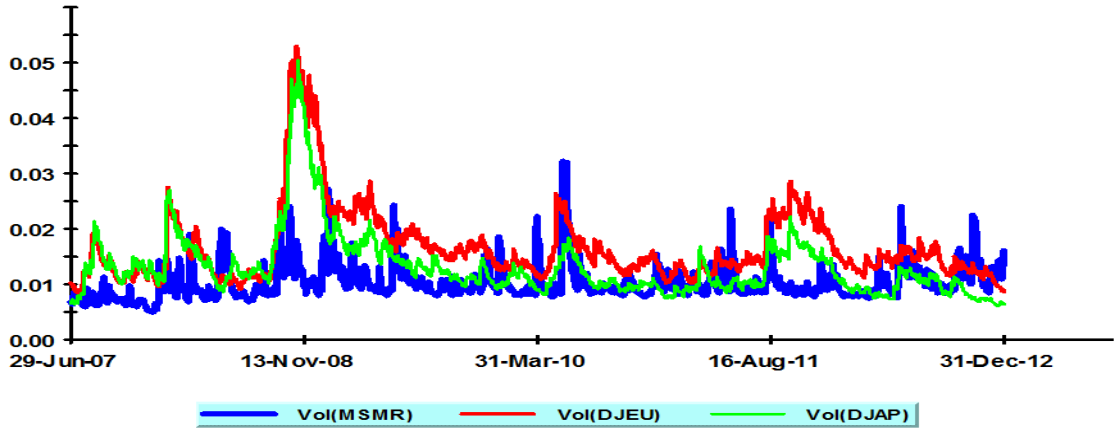
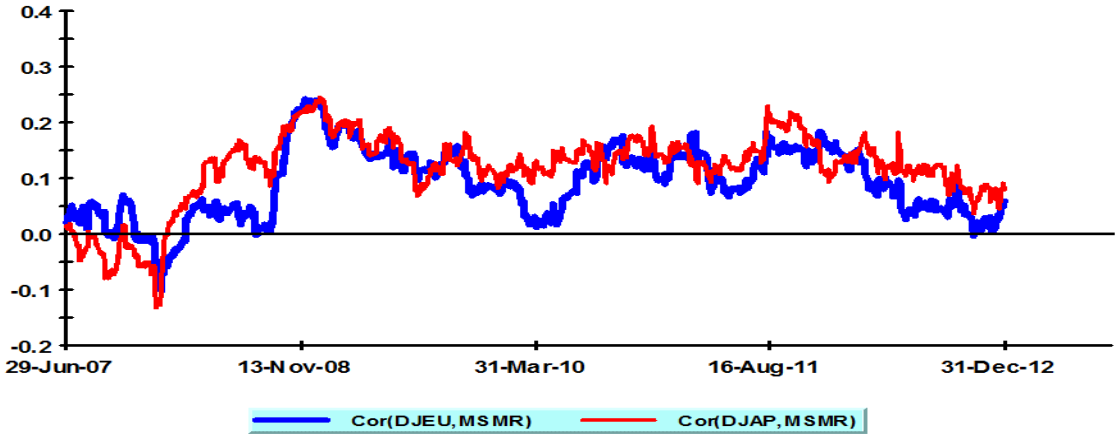


Figure 7:Conditional Correlations of MSMR,DJEU and DJAP



Next, we again carried out forecasting of the conditional volatilities and correlations of the Islamic indices undertaken in this section of the study. The figures tend to show that the conditional volatility and correlations between the Islamic indices returns are likely to increase immediately after the inception of the forecasting period except for the Moroccan Islamic index which starts at 1 January 2013 which gradually flattens out, signifying that the stability of the Islamic stock markets are being achieved gradually. Suprisingly for the forecast of conditional correlations, it was seen that the correlation of Moroccan Islamic markets with Asia pacific markets are higher compared to the European Islamic markets.

Figure 8:Forecasted conditional volatility of MSMR,DJUK and MSTWN

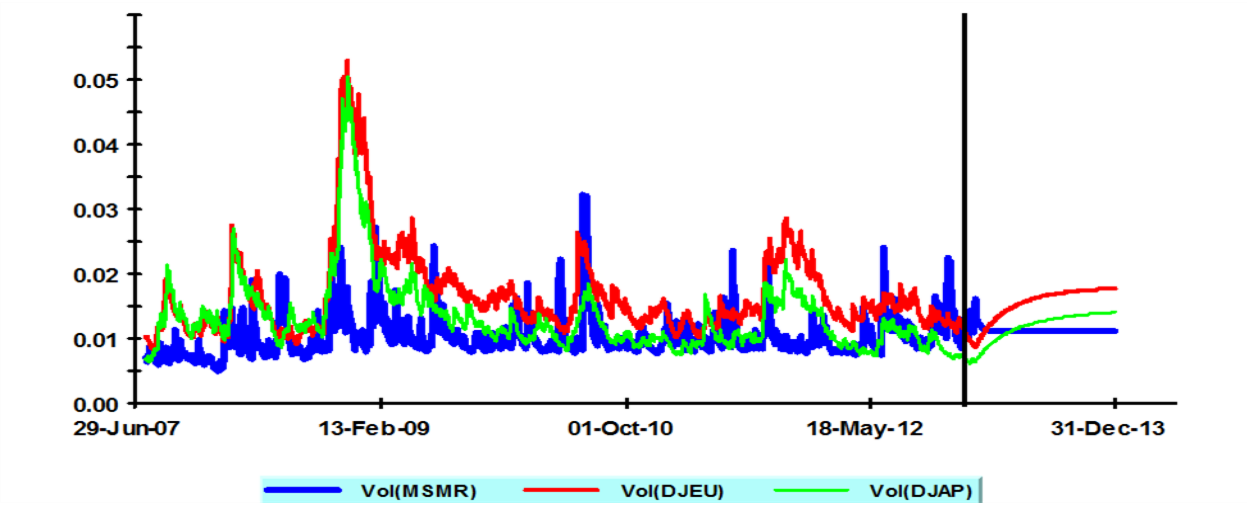
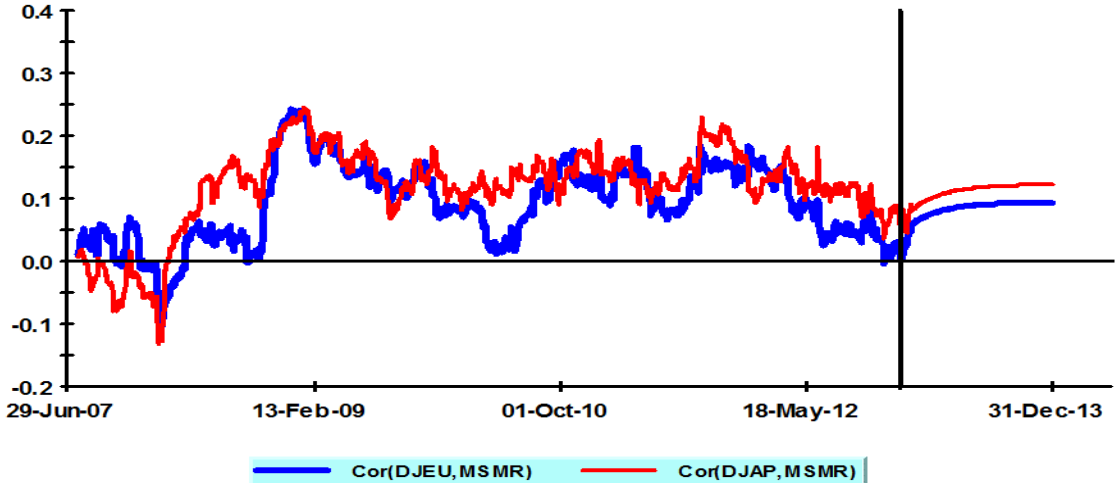


Figure 9:Forecasted conditional correlations of MSMR,DJUK and MSTWN



As with the first section of the results, we also ran tests for robustness for the low correlations of the Moroccan Islamic index returns with the Islamic European index returns.It was found that United Kingdom had the highest share of stock which is 27.74% of the total stocks in the Dow Jones Islamic European Index..While for the Dow Jones Islamic Asia Pacific index, Taiwan again has the highest share of stocks which is 18.1% according to the Datastream database. So like we did in the first part, we carried out test for robustness to ensure the validity of the results by running a M-GARCH DCC with Moroccan Islamic stock index and the United Kingdom represented by the Dow jones Islamic United Kingdom index and Taiwan which is represented by the MSCI Islamic Taiwan index.Like usual we will first a get the Gaussian model followed by the t-DCC model. In this case, t-DCC model is more appropriate since the maximized log-likelihood of the t-dcc (12719) is higher than the one in the Gaussian model (12588.1).

Figure 14 : Maximum Likelihood estimates of Gaussian model on stock indices daily returns

Parameter	Estimate	Standard Error	T-Ratio	Probability
lambda1_MSMR	0.62141	0.10761	5.77460	[.000]
lambda1_DJUK	0.90286	0.01724	52.38040	[.000]
lambda1_MSTWN	0.92924	0.01380	67.33610	[.000]
lambda2_MSMR	0.13475	0.02633	5.11810	[.000]
lambda2_DJUK	0.08474	0.01344	6.30660	[.000]
lambda2_MSTWN	0.06297	0.01125	5.59730	[.000]

delta1	0.99034	0.00644	153.88440	[.000]
delta2	0.00429	0.00258	1.66150	[.097]
Maximized Log-Likelihood	12588.1			

Table 15:Unconditional volatilities and correlations

	MSMR	**DJUK**	**MSTWN**
MSMR	***0.01110***	0.10112	0.08122
DJUK	0.10112	***0.01865***	0.32115
MSTWN	0.08122	0.32115	***0.01469***

Table 16: Maximum Likelihood estimates of t-DCC model on stock indices daily returns

Parameter	**Estimate**	**Standard Error**	**T-Ratio**	**Probability**
lambda1_MSMR	0.73178	0.07297	10.0291	[.000]
lambda1_DJUK	0.91735	0.01750	52.4246	[.000]
lambda1_MSTWN	0.93727	0.01432	65.4346	[.000]
lambda2_MSMR	0.14765	0.03088	4.7818	[.000]
lambda2_DJUK	0.06849	0.01299	5.2726	[.000]
lambda2_MSTWN	0.05415	0.01145	4.7282	[.000]
delta1	0.97609	0.01380	70.7459	[.000]
delta2	0.00910	0.00405	2.2463	[.025]
df	7.01670	0.59392	11.8142	[.000]
Maximized Log-Likelihood	12719			

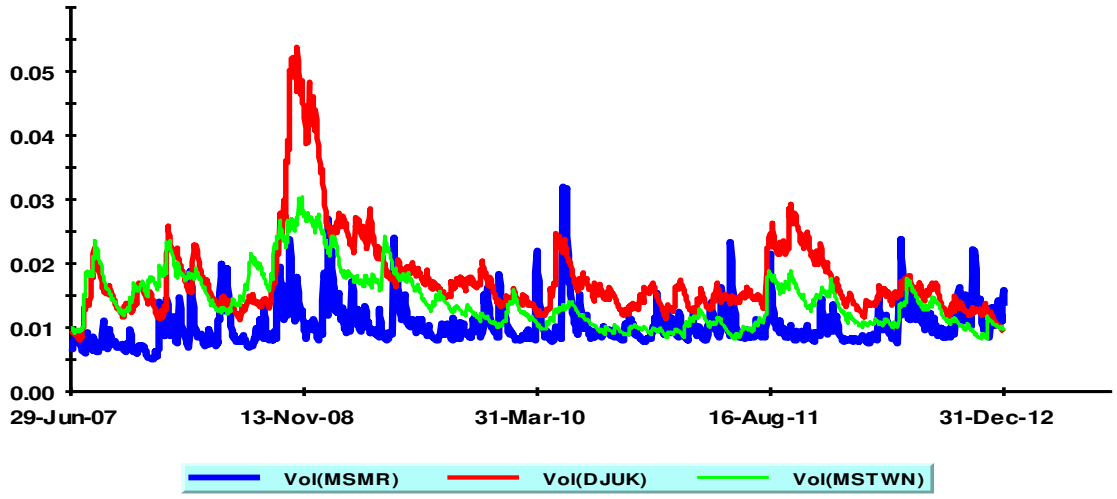
Table 17:Unconditional volatilities and correlations

	MSMR	**DJUK**	**MSTWN**
MSMR	***0.01110***	0.10112	0.08122
DJUK	0.10112	***0.01865***	0.32115
MSTWN	0.08122	0.32115	***0.01469***

The unconditional volatilities indicate that the returns of the Moroccan Islamic index the lower compared to the United Kingdom and Taiwan Islamic indices which is consistent with the results

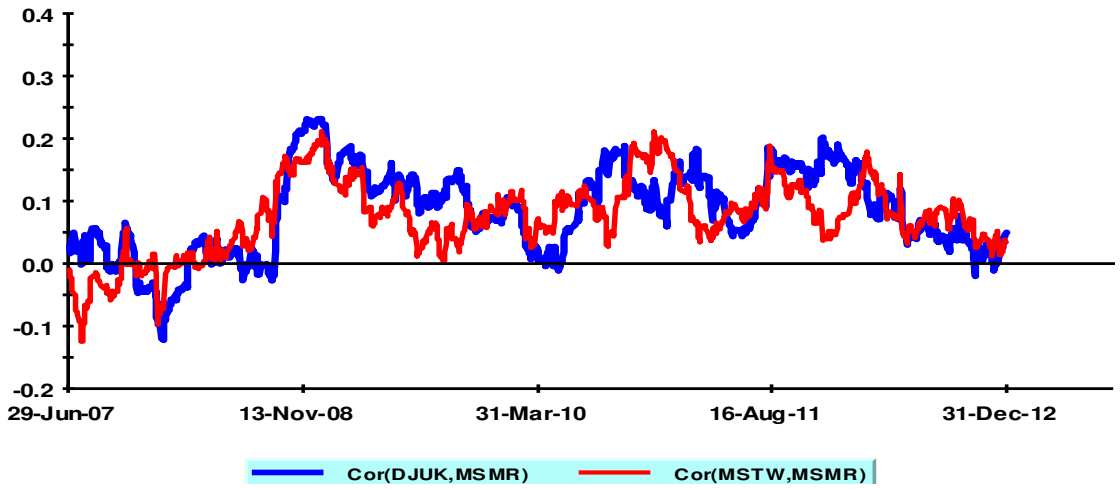
obtained before the test of robustness was carried out. As for unconditional correlations, the results astonishingly shows that Moroccan Islamic index returns correlate more with the United Kingdom Islamic returns(0.10) as compared to the Taiwan Islamic index returns(0.08) which is not in line with the unconditional correlations obtained before carrying out the test of robustness

Figure 10:Conditional volatilities of MSMR,DJUK and MSTWN



Speaking about conditional volatilities , they are consistent with the unconditional returns in which the returns of the United Kingdom Islamic index is most volatile most of the time especially during the global financial crisis period in 2008 and during the European sovereign debt crisis (Najeeb, Bacha and Masih, forthcoming) in late 2011 which exhibited a gap from the other two indices which are the Moroccan and Taiwan Islamic index.

Figure 11:Conditional correlations-MSMR,DJUK AND MSTW



As for the conditional correlations, the results again confirm with the unconditional volatilities but seem to not be in line with the results before the checks of robustness were carried out since the UK(representing Europe) is found to be highly correlated with Morocco as compared to Taiwan(Asia Pacific) for most of the time. Since the previous results were not robust, we had to carry out some further research to determine which stock index is more beneficial for Moroccan investors whether it is the United Kingdom stock market representing Europe or the Taiwan stock market representing Asia Pacific

Europe itself is situated near Morocco which is in North Africa and the relation between them can be dated back to the earlier times of Andalusia when a Muslim community was established in Spain particularly in Andalusia when the Muslims from morocco migrated to that area (Beig n.d.). In other words, Morocco has historically been heavily tilted towards Europe. The EU is the most important trading partners for most North African nations including Morocco(Masetti et. al 2013). In modern terms, we can relate to geographical proximity to empirical study done by Janakiramanan and Asjeet(1998) which discovered that countries that are geographically close should exhibit high levels of integration which may induce higher correlations.

On a larger platform, Morocco itself has close ties to the European Union (EU) despite the situations where relations are occasionally complicated by issues of human rights and the Western Sahara. The EU provides considerable aid and has strongly support Morocco during times of political reforms. In February 2012, the EU parliament approved a new trade deal that expands the duty-free treatment of agricultural, food,and fisheries products on both sides. Other than that, agreement regarding lucrative fisheries including the coastline of the disputed Western

Sahara was discontinued in 2011 due to some EU parliamentarians' objection to conditions in Western Sahara, as well as environmental and economic concerns. A new agreement was then brokered in 2013 and awaits EU ratification. The EU also seeks Moroccan cooperation to stem illegal immigration and drug trafficking via Morocco to Europe (Arieff 2013)

Other than that, in line with offering global solutions, Moroccan leather goods producers for the past few years have tend to focus on offering high quality goods in order to respond to increasing (low cost) Asian competition. As a result, share of value added did not just only increased but also the production of high quality brands such as Pierre Cardin or Louis Vuitton have started in Morocco. From here,it can be clearly seen that relationship of Europe with Morocco is not as strong with Asia pacific (Textiles, Clothing and Leather n.d.)

From the above reasoning, we conclude that Europe(represented by United Kingdom is more correlated with morocco Islamic stock index returns (referring to figure) except during political unrest that occurred around from February to July 2011 and towards the end of 2012 and also after the EU-Morocco summit in March 2010 meaning that in order to gain more diversification benefits, Moroccan investors should invest in Asia pacific Islamic markets, except during the previously stated events.

People then may argue why should investors in Morocco Islamic index avoid to invest in emerging markets but it is encouraged to invest in Asia pacific market. A reason for this could be that Egypt which is a north African country is included in the emerging market index, But as for asia pacific markets , no North African countries are included which some how indirectly enhance the correlation between morocco and the emerging markets that could happen by spillover caused during the Arab spring in Egypt. It should be reminded that Morocco managed to minimise the effects from such events but still at the end of the day we can say that there is indirect effect coming from political tensions in Egypt(Sakthivel 2013).

As an overall view from the results obtained, it can be seen that volatilities of the Moroccan Islamic index were not really high during the event of political tensions or in other words, the peak was moderate. With regards to portfolio diversification among the market based indices, Moroccan Islamic investors are better off investing in the Developed markets index especially during times when political uncertainties are not happening to gain more portfolio diversification compared to other emerging stock markets. For the regional based indices, Moroccan Islamic

investors can gain better portfolio diversifications by investing in the Asia pacific markets except during times of political unrest. Therefore, political turmoils in Morocco do impact the volatilities but not by a huge impact and it also affects correlations in which the correlations between indices(regardless whether it is market or regional based) will tend to move together making investors being indifferent to choose which market to invest in to gain diversification benefits.

7.0 Conclusion and Policy Implications

This study examines the volatilities and correlations between the Moroccan Islamic index returns and the returns of the Islamic stock indices from the market based(Emerging and Developed) and regional based indices(European and Asia pacific) which can imply the extent of the potential diversification benefits among these Islamic indices for the Moroccan Islamic investors especially during political unrest. Daily data spanning from June 2007 to December 2012 was used together with employing the M-GARCH DCC techniques. The study found that Morrocan Islamic investors who have allocated their investments in emerging markets like and European markets may not experience great diversification benefits..Instead, portfolio diversification benefits are greater if Moroccan Islamic investors invest in the Developed markets stock index and the Asia Pacific index except during times of political unrest .Thus, political unrest seems to have impacted the correlation between these Moroccan Islamic stock index together with the volatility even if it is in an indirect way. Overall the results of this study supports the previous empirical literatures that political unrest do affect the volatility of stock markets although the affect is moderate for the case of or study..Results of this paper are deemed to have significant implications for contributing to the current debate on the role of political risk in asset pricing and volatility behaviour and are of great importance towards Moroccan Islamic investors and portfolio managers and even government authorities regarding the allocations and stock index policies. Political uprisings that are constantly happening happen to shake the confidence of investors to the core which then leads to the turbulent situation in the financial markets . As an implication from such happenings, business confidence must be restored back by the authorities to promote the financial stability and economic growth of Morocco(Chau et. al 2014).

8.0 Recommendations for future research

Relating to a wider spectrum, the results from this study can be used as a benchmark for further research related to time varying volatilities and correlations. Other form of recent research methodology techniques such as wavelet decomposition methods, panel techniques and non linear techniques involving the Markov switching process can be applied to provide more insightful results. Other than that, further studies can consider investigating the volatilities and correlations of each nation experienced by the Arab spring towards major markets and then making a comparison between them to get more robust results.

9.0 References

Abou-Zaid, A.S, Volatility spillover Effects in Emerging MENA Stock Markets 2011, Review of Applied Economics , 7 (1-2) .

Al Jazeera 2014, Timeline: Arab Spring; A detailed review of major events looking back at three years of Arab Uprisings across the region. Available from: <http://www.aljazeera.com/indepth/interactive/2013/12/timeline-arab-spring-20131217114018534352.html>

Ali,S, Butt,B.Z, and Rehman, K. 2011, "Comovement between Emerging and Developed Stock Markets: An Investigation Through Cointegration Analysis", *World Applied Sciences Journal* 12(4): 395-403.

Arieff, A. 2013, *Congressional Research Service :Morocco Current issues*. Available from: https://www.fas.org/sgp/crs/row/RS21579.pdf>

Beig, M. N., *Andalusia When it was…* Available from: <http://www.hispanicmuslims.com/andalusia/andalusia.html>

Bollerslev, T., 1990, 'Modelling the coherence in short-run nominal exchange rate: A multivariate generalized ARCH approach', *Review of Economics and Statistics*, 72, 498-505.

British Broadcast Channel 2013, Morocco profile. Available from: <http://www.bbc.com/news/world-africa-14123260>

Capiello, R , Engle, R.F and Sheppard, K. 2003, 'Asymmetric Dynamics in the Correlations of Global Equity and Bond Returns', *European Central Bank Working Paper Series*,Working Paper No. 204 .Available from: < http://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp204.pdf>

Celik, S. 2012, The more contagion effect on emerging markets : The evidence of DCC-GARCH model, *Economic Modelling*, 29, 1946 – 1959.

Chau, F, Deesomsak, R and Wanh, J. 2014, 'Political uncertainty and stock market volatility in the middle east and north African(MENA) countries', *Journal of International Financial Markets , Institutions and Money*, 28, 1-19.

Council of the European Union 2010, *Joint statement European Union-Morocco Summit*. Available from: < http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/er/113247.pdf>

Engle, RF 2002, 'Dynamic Conditional Correlation:A Simple Class of Multivariate Generalized Autoregressive Conditional Heteroskedasticity Models', *Journal of Business and Economics Statistics,* 20(3), 339-350.

Engle, RF 2001, 'GARCH 101: The Use of ARCH/GARCH Models in Applied Econometrics', *Journal of Economic Perspectives*, 15(4), 157–168.

Engle, RF and Sheppard, K 2001, 'Theoretical and Empricial Properties of Dynamic Conditiional Correlation Multivariate GARCH', *National Bureau of Economic Research* Working Paper 8554. Available from: < http://www.nber.org/papers/w8554.pdf>

Fama, E 1970, 'Efficient Capital Markets: A Review of Theory and Empirical Work', *Journal of Finance*, 25 (2), 383-417.

Ghini, AE and Saidi, Y 2014, Return and Volatility Spillovers in the Moroccan Stock Market During the Financial Crisis, Munich Personal RePEc Archive Paper No. 53439. Available from: < http://mpra.ub.uni-muenchen.de/53392/> .

Glosten, GR, Jaganathan , R and Runkle, E 1993, 'On the Relation between the expected Value and the Volatility of the Nominal excess Return on Stocks', *The Journal of Finance*, 48 (5), 1779-1801.

Janakiramanan,S and Asjeet, S.L 1998, 'An empirical examination of linkages between Pacific Basin stock markets*', Journal of International Financial Markets, Institutions and Money*, 8, 155-173.

JP Morgan n.d., *Non-normality of Market Returns :A framework for asset allocation decision-making.* Available from: <http://www.jpmorganinstitutional.com/blobcontent/42/35/1159384839488_Non_normality_long.pdf> .

Kabir,S.H, Masih, A.M.M and Bacha,O.I, 'Are Islamic equities Immune to Global Financial Turmoil? An Investigation of the Time Varying Correlation and Volatility of Islamic Equity Returns', *Australian Journal of Basic and Applied Sciences*, 7(7), 686-701.

Lanza , A, Manera, M and McAleer, M. 2006, Modelling dynamic conditional correlations in WTI oil forward and futures returns, *Finance Research Letters* .

Lebo,M.J and Box-Steffenmeier,J.M 2008, 'Dynamic Conditional Correlations in Political Science', *American Journal of Political Sciences*, 52 (3), 688-704.

Lee,J and Crowley, P 2004, *The Co-movement between Output and Prices :Evidence from Canada.* Available from:< http://faculty.tamucc.edu/jlee/research/WP20042b.pdf>

Masetti,O, Korner,K, Forster M and Friedman, J 2013, *Two years of Arab Spring, Where are we now? What's next?* Availablefrom:<https://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000300328/Two+years+of+Arab+Spring%3A+Where+are+we+now%3F+What%E2%80%99s+next%3F.pdf>

Mekouar, A, n.d. *Morocco-An exception*. Available from: <http://www.perahlmarkstiftelsen.se/downloads/Aziz%20Mekouar.pdf>

Najeeb, Syed F., Bacha, O. And Masih M. 2014, 'Does Heterogeneity in Investment Horizons affect Portfolio Diversification? Some Insights using M-GARCH –DCC and Wavelet Correlation Analysis', *Emerging Markets Finance and Trade* (forthcoming).

Pesaran,B. and Pesaran,M.H. 2007, 'Modelling Volatilities and Conditional Correlations in Futures Markets with a Multivariate t Distribution', *Cesifo Working Paper No. 2056 Category 10: Empricial and theoretical Methods July 2007*. Available from: < http://ideas.repec.org/p/ces/ceswps/_2056.html>

Pesaran, B. and Pesaran, M.H. 2009. *Time Series Econometrics using Microfit 5.0*. Oxford: Oxford University Press.

Portfolio Theory, n.d., *An overview of Harry Markowitz portfolio selection work.* Available from: <http://portfoliotheory.co.uk/

Sakthivel, V. 2013, *Egypt's Limited Reverberations in Morocco*. Available from: < http://www.washingtoninstitute.org/policy-analysis/view/egypts-limited-reverberations-in-morocco>

Tawill,C. 2013, *Morocco's Stability in the Wake of the Arab Spring*. Available from: <http://www.ctc.usma.edu/posts/moroccos-stability-in-the-wake-of-the-arab-spring>

Textiles, Clothing and Leather n.d. ,*The textiles, leather, and clothing sector in Morocco*, Available from: <http://www.industriall-europe.eu/socdial/TL/2013/morocco-1%20textile%20clothing%20leather.pdf>

Tse, Y. K and Tsui, A.K.C. 2002, 'A Multivariate Generalized Autoregressive Conditional Heteroscedasticity Model with Time-Varying Correlations', *Journal of Business and Economic Statistics,* 20 (3), 351-362

You, L. and Daigler, R.T 2010, Is International Diversification Really Beneficial?, *Journal of Banking & Finance,* 34, 163-173.