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Portfolio diversification between exchange rates and islamic stocks: evidence from the USA, Euro area, Japan and Malaysia

Mustafa Kabir¹ and Mansur Masih²

Abstract:

This paper uses the daily data from four countries to estimate the portfolio diversification opportunities between Islamic stock prices and exchange rates. Although there are many works on stocks and exchange rates in the field of conventional finance, there is relatively few work in the field of Islamic finance. This study makes an attempt to fill in this gap by applying recent and appropriate methodologies such as, MGARCH-DCC, MODWT and CWT. The results tend to indicate that the portfolio diversification opportunities between Islamic stocks and exchange rates are not conclusive but vary depending on the stock- holding periods in the short and long run. Hence the Islamic stock holders should take into account the investment horizons of their stocks while diversifying their stocks across with exchange rates.

Keywords: Islamic stocks, exchange rates, portfolio diversification, MGARCH-DCC, MODWT, CWT, Malaysia

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1. Introduction

This paper will investigate the relationship between daily Islamic stock price index and exchange rate index for four countries for a period of twelve years covering the two recent financial crises (2008-2013) and compare the results with those in the previous period where stock markets were operating under normal conditions. There are many papers which studied the relationship of conventional stock price index and exchange rate and they have shown contrasting empirical evidence. The relationship between the two financial variables-stock returns and exchange rates became especially significant in the wake of the 1997 economic crisis in Asian countries, which caused stock prices and exchange rate to fall across Asian markets. The relationship between stock returns and foreign exchange rates has frequently been utilized in predicting the future trends for each other by investors. Moreover, the continuing increases in the world trade and capital movements have made the exchange rates as one of the main determinants of business profitability and equity prices (Kim, 2003). Exchange rate changes directly influence the international competitiveness of firms, given their impact on input and output price (Joseph, 2002). Economic theory suggests that foreign exchange rate changes can have an important impact on the stock price by affecting cash flow, investment and profitability of firms, there is no consensus about these relationship and the empirical studies of the relationship are inconclusive (Joseph, 2002; Vygodina, 2006). Essentially, foreign exchange rate volatility influences the value of the firm since the future cash flows of the firm change with the fluctuations in the foreign exchange rates. For example, exporters will lose their competitiveness in international market if the Exchange rate appreciates and because of that the sales and profits of exporters will shrink and the stock prices will decline. And the importers will increase their competitiveness in domestic markets. The depreciation of exchange rate will make adverse effects on exporters and importers. That is, currency appreciation has both a negative and a positive effect on the domestic stock market for an export-dominant and an import-dominated country, respectively (Ma and Kao, 1990). Domestic firms can also be influenced by changes in exchange rates since they may import a part of their expensive and exported outputs cheaper for a firm. Thus, devaluation will make positive effect for export firms (Aggarwal, 1981) and increase the income of these firms, consequently, boosting the average level of stock prices (Wu, 2000). Thus, understanding this relationship will help domestic as well as international investors for hedging and diversifying their portfolio. 'Islamic Financial Sector' have showed a tremendous growth over the last

decade. The Islamic financial system is based on the fundamentals of Shari'ah (Islamic Law) that requires gains from investments to be earned in an ethical and socially responsible manner that comply with teachings of Islam (DeLorenzo, 2000). Equities traded under Shari'ah indices undergo a screening process to ensure they are free from prohibitive elements as dictated by Shari'ah. The common elements screened for the indexes are riba (interest rates), gharar (uncertain outcomes), maysir (gambling), prohibited commodities (liquour, pork, etc.) and fulfilment of contractual requirements as required in Islamic Law of Contracts (Rosly, 2005). Where Conventional finance sector is very big and they are doing businesses in speculation, finances in interest term loan, investing in halal and non-halal businesses etc. This is where the Islamic financial sector having their strength to compete with conventional finance sector and we should have more proper research and analysis to see whether the 'Islamic Financial Sector' is really growing or drowning. Because most of the finance market crisis's happened till today is because of the conventional finance market crash where they used to invest in interest based debt instruments such as subprime crisis, sovereign debt crisis etc. Because of all these finance market crisis's, Money market is the one which got the instant impact through exchange rates of that respective currencies of these countries and spread the crisis to the other countries through exchange rates. Besides this, there are many determinants of exchange rates which cause changes to the currency market frequently, this causes the stock market more volatile or we can say because of over demand (supply) of money in the economy causes the stock market volatile which causes the currency market more unstable at the end. One of the most important determinants of exchange rate is interest. There is a huge capital movement all over the world based on higher or lower interest rates which causes the demand (supply) for money high or low which pushes the stock prices to go up or down based on the appreciation or depreciation of the exchange rate for that respective country. Where we can easily notice that the exchange rates are being adjusted based on the demand and supply of any currency against the other currencies, where the demand and supply of that currency may be caused by speculative activities, interest related debt activities, balance of payment (BOP) activities, inflations etc. In this case, where does the Islamic stock stands? Is there any impact on the Islamic stocks prices because of exchange rate changes or what is the relationship between Islamic stocks and exchange rates? There are very few empirical research paper found on the relationship between Islamic stocks and exchange rates. The purpose of this paper is to enrich the empirical research for Islamic stocks by providing further evidence on the relationship between exchange rates and Islamic stock prices. The

main contribution of the paper is that to my knowledge, for the first time in the literature on exchange rate and Islamic stock price interaction this paper empirically testing for the ‘time-varying’ and ‘scale dependent’ volatilities and correlations of the sample markets. To make this possible this study have used ‘three’ modern empirical research techniques: Multivariate Generalized Autoregressive Conditional Heteroscedastic – Dynamic Conditional Correlations (M-GARCH-DCC) model of Engle (2002), Continuous Wavelet Transform (CWT) analysis of volatility and correlations, and the Maximal Overlap Discrete Wavelet Transform (MODWT) analysis.

The paper is organized as follows: Section-2 literature review and theoretical foundations, Section 3 Research objectives of the paper along with proposed contributions to literature, Section 4 Methodology, Section 5 Empirical results and discussion, Sections 8 Conclusion and limitation of the study following with the references.

2. Literature Review and Theoretical Background:

The study on linkages between stock price and exchange rate has received widespread attention in economics and finance literature. According to Athanasios Tsagkanos* and Costas Siriopoulos, 2013, the first clue for correlation between exchange rates and stock prices provides Aggarwal (1981). He explains the correlation based on good market hypothesis and showed that there is a correlation between these two variables but he did not find in which direction is moving this correlation. However, there are many studies which show the direction of this relationship between stock and exchange rate. Najang and Seifert (1992) used GARCH models for daily data from Canada, UK, USA, Japan and Germany and found that volatility of exchange rates is positively affected by absolute differences in stock returns. Ajayi and Mougoue (1996), using daily data for eight countries, show significant interactions between foreign exchange and stock markets. Abdalla and Murinde (1997) using data from 1985 to 1994 in India, Korea, Pakistan and the Philippines concluded that exchange rates cause stock prices. Pan, Fok & Lui (1999) used daily market data to study the causal relationship between stock prices and exchange rates and found that the exchange rates Granger-cause stock prices with less significant causal relations from stock prices to exchange rate. They also find that the causal relationship have been stronger after the Asian crisis. Instead, the study of Mohamad and Mahmood (2001) in Malaysia during the economic

crisis in Asia (1997–1999) showed that contemporaneous squared returns and absolute returns in exchange rate are able to explain stock returns volatility and not vice versa. The authors used GARCH (1,1) in order to take into account the nonlinear dependence of the data generating process. Even though many of the authors find out that there is a correlation between this two market, there is contradictory results comes out about whether the relationship is unidirectional or bidirectional, strength of the relationship, long term, short term or time variant etc. I have organized few of their contradictory find outs as follows:

Bahmani-Oskooe and Sohrabian (1992) were the first that used co-integration Granger causality analysis for testing the direction of the correlation between stock prices and exchange rates. They concluded exchange rate changes do affect stock prices but absence of long-run relationship between the two markets and reported a short term relationship between these two variables. They also found bidirectional causality. The non-significance of long-run relationship between the two markets is confirmed by other studies (Granger et al., 2000; Nieh and Lee, 2001; Smyth and Nandha, 2003) that use cointegration tests. Nieh and Lee (2001) found that there was no significant relationship between stock prices and exchange rates in the G-7 countries, using both the Engle and Granger two-step methodology and Johansen maximum likelihood cointegration tests. Ramasay and Yeung (2005) employed Granger causality methodology in his study in nine East Asian economies. They found that “the direction of causality tends to demonstrate a hit-and run behaviour and switches according to the length of period chosen”. However, what I can understand here that according to them, although empirical results show that there is bidirectional causality between stock prices and the effective exchange rate, despite there being no long run relationship between the two variables.

Ajayi and Mougoue (1996) applied error correction model and causality test in Canada, UK, USA, Japan, Germany, France, Netherlands and Italy which showed that currency depreciation has both negative long-run and short-run effect on the stock market. Using Granger causality test Wu (2000) and Hatemi-Irandoust (2002) found unidirectional causality from stock market to exchange rates in Singapore and Sweden, respectively. They used monthly data from 1993 to 1998 in analysing stock prices in Sweden. Granger et al. (2000) investigated the relationship between stock and foreign exchange markets of nine Asian countries during the Asian financial crisis. They found that foreign exchange market takes the lead and has an impact on the stock market in Japan and Thailand; stock market takes the lead in Taiwan; the relationship is bidirectional in Indonesia, South Korea, Malaysia,

and the Philippines; and that no such relation exists in Singapore. Kim (2003) adopted the multivariate cointegration and error correction model in analysing the relationship between stock and foreign exchange markets in the U.S. from 1974 to 1998; results showed that stock prices and exchange rates, whether in the long or short run, are negatively correlated. Ibrahim and Aziz (2003) used monthly data of stock prices, exchange rates, and money supply in Malaysia from 1977 to 1998. They, too, concluded that the relation between stock and foreign exchange markets is negative; when domestic currency depreciates, the stock prices will also decrease. Sevuktekin and Nargelecekenler (2007), using monthly data from 1986 to 2006, found positive and bidirectional causality between these two variables in Turkey. Stavarek (2004) reported unidirectional causality running from stock prices to exchange rates, and Tabak (2006) showed that a stock prices lead exchange rates with a negative relationship.

The study conducted by Ong and Izan (1999) shows that there is a weak relationship between exchange rates and stock prices in Australia and the Group of Seven countries. They examined the relationship between spot and 90-day forward exchange rates for G-7 countries and Australia and reported no significant relationship between equity prices and exchange rates. In contrast to practise theories the theory of asset market models by Frenkel (1976) supports the absence of any relationship between exchange rates and stock prices. The changes are due to different factors that lead the market of exchange rates and the market of stock prices to be fully segmented. However, Ajayi and Mougoue (1996) point out that there are certain common factors such as the interest rates that may join the two markets. Although in the economic theory seems to prevail the good market hypothesis, in empirical level there is a strong disagreement not only for the direction of the relationship between stock prices and exchange rates but also for the existence or not of this relationship.

Hodrick (1990) argued that it is not so much the movement of either these two markets that particularly affects the other, but that it is the underlying economic fundamentals. For the stock markets, these include future dividends and discount rates. He argues that the determination of market fundamentals for exchange rates requires general equilibrium considerations since exchange rates play many roles in the economy. The demand for and supply of money are particularly important” (Hodrick, 1990, p. 186). Smyth and Nandha (2003) in India and Sri Lanka. Kollias et al. (2010) using rolling Granger causality tests for euro-dollar and two composite European indices indicate that causality is time-variant. Under normal conditions the direction is located from exchange rates to stock prices whereas under stressful conditions holds the reverse direction. The findings are moving on the same wavelength with Pan et al. (2007) claiming that the outlined theories cannot properly explain the relationship between stock prices

and exchange rates. They found that the relationship between stock and foreign exchange markets in Asian differs depending on countries and time (before or after the Asian financial crisis). I-Chun Tsai (2012) found that the relation of these two markets in Asia, which indicates that the negative relation between stock and foreign exchange markets is more obvious when exchange rates are extremely high or low. His paper uses the quantile regression model to observe the various relationships between stock and foreign exchange markets and the data of six Asian countries to estimate the relationship between stock price index and exchange rate. Athanasios Tsagkanos*, Costas Siriopoulos (2013), exhibit a causal relationship from stock prices to exchange rates that is long-run in EU and short-run in USA. They examine the long-run relationship adopting a more advanced econometric model, the structural nonparametric cointegrating regression. This is very clear from the review above, there are inconsistencies in empirical literatures in analysing the relationship of exchange rates and stock prices.

3. Research Objectives and Contributions

In the literature and theoretical review, we presented how various theoretical and empirical literature provided contradicting insights about the relationship of stock markets and currency exchange rates. Overall, it was clear that there is a relationship or link between stock market and currency exchange rates whether the relationship is short term, long term or time variant, positive or negative. Most of these studies make use of time-series techniques of co-integration causality where they test the relationship country bases by using dependant or independent economic variables. Besides, there are not many studies on consider using wavelet transformations to time-scale volatilities and correlations.

The purpose of this paper is to enrich the empirical research for Islamic finance by providing further evidence on the relationship between exchange rates and Islamic equity prices. The main contribution of the paper is that to my knowledge, for the first time in the literature on exchange rate and Islamic stock price interaction this paper empirically testing for the ‘time-varying’ and ‘scale dependent’ volatilities and correlations of the sample markets. To make this possible this study have used ‘three’ modern empirical research techniques: Multivariate Generalized Autoregressive Conditional Heteroscedastic – Dynamic Conditional Correlations (M-GARCH-DCC) model of Engle (2002), Continuous Wavelet Transform (CWT) analysis of volatility and correlations, and the Maximal Overlap Discrete Wavelet Transform (MODWT) analysis. And the specific research questions of this paper are as follows:

- A. What is the relationship between Islamic equity prices and exchange rates?
- B. What is the impact of exchange rate changes to the Islamic equity market?

- C. Should the Islamic equity market investors consider about the exchange rates volatility while diversifying their portfolio to the international markets?

The answers for each of the research questions are probable to have significant inferences for Islamic stock investors and fund managers in their decisions about portfolio diversifications and investment horizons across the world.

4. METHODOLOGY:

4.1 MGARCH-DCC:

One of the methods this study applied is the multivariate GARCH model to estimate the Dynamic Conditional Correlations (DCC) for a portfolio composed of asset returns. The DCC enables us to determine whether the shocks to the volatilities in asset returns are substitutes or complements in terms of taking risk. DCC allows for changes both in the first moment (mean) and the second moment (variance) which can locate precisely the timing and nature of plausible changes in the time series co-movement. For each time point, the DCC method gives a value that serves as the forecasted correlation between series for the next period. In the first stage, univariate volatility parameters are estimated using GARCH models for each of the variables. In the second stage, the standardized residuals from the first stage are used as inputs to estimate a time varying correlation matrix.

5.2 Continuous Wavelet Transformation (CWT)

The original time series data can be measured by the CWT, where the function of just one variable time-separate into function of two different variables such as time and frequency. CWT is the updated version of DWT/MODWT, CWT has an advantage over DWT/MODWT, according to the length of data CWT generates itself the number of wavelets (time-scales). Because of the two-dimensional figure in the CWT series correlations we can easily identify and interpret patterns or hidden information. For both MODWT and CWT, we use the Daubechies (1992) least asymmetric wavelet filter of length $L=8$ denoted by LA (8) based on eight non-zero coefficients. Previous studies on high-frequency data have shown that a moderate-length filter such as $L = 8$ is adequate to deal with the characteristic features of

timeseries data (see Gencay et al., 2001, 2002, In and Kim 2013, etc.). In literature, it is argued that an LA (8) filter generates more smooth wavelet coefficients than other filters such as Haar wavelet filter.

5.3 Maximum Overlap Discrete Wavelet Transformation (MODWT)

MODWT is the update to the earlier DWT-based estimators (Percival, 1995). The MODWT is a time variant of the discrete wavelet transform that can handle any sample size and not just those that are multiples of 2. The MODWT is highly redundant, non-orthogonal transform - this enables alignment of the decomposed wavelet and scaling coefficients at each level with the original time series, thus allowing a ready comparison between the series and its decompositions.

5. EMPIRICAL RESULTS AND DISCUSSION:

5.1 Data Summary Statistics

To fulfil the research objective of this study, we have used the Islamic stock indices and exchange rate indices from four countries and they are USA, EURO AREA, JAPAN and MALAYSIA. From these four countries, we choose the indexes as follows (we included the short name of the variables):

USA

- a. DJ ISLAMIC TITANS 100 - PRICE INDEX- (DJISI)
- b. US \$ INDEX 2000=100 (JPM)NN - TRADE WEIGHTED - (USDI)

EURO AREA

- a. DJ ISLAMIC EURO - PRICE INDEX - (EUISI)
- b. EURO INDEX 2000=100 (JPM)NB - TRADE WEIGHTED - (EURI)

JAPAN

- a. DJ ISLAMIC JAPAN \$ - PRICE INDEX - (JPISI)
- b. JAPAN YEN INDEX 2000=100 (JPM)NB - TRADE WEIGHTED – (YENI)

MALAYSIA

- a. MSCI MALAYSIA ISLAMIC : I - PRICE INDEX – (MYISI)
- b. MALAYSIA RING. INDEX 2000=100 (JPM)NB - TRADE WEIGHTED – (RMI)

We took the DJ ISLAMIC TITANS 100 - PRICE INDEX and US \$ INDEX 2000=100 (JPM) NN - TRADE WEIGHTED from USA because Dow Jones Islamic index is worldwide Islamic index as the USD is a world traded currency. And EURO AREA represents many countries together, so we found it better not to go for a specific country from that region while all the countries are under one umbrella and these two DJ ISLAMIC EURO - PRICE INDEX and EURO INDEX 2000=100 (JPM)NB - TRADE

WEIGHTED representing the whole EURO AREA. JAPAN is one of the financial leading countries not just in Asia but in the world, they have a good track for Islamic stock index based in JAPAN for Islamic finance. And MALAYSIA is the Islamic finance leading country in Asia.

we chose to take the trade weighted currency index for all these four countries because I am not using any control variables or economic variables for exchange rates. This will give us the better explanation when we are comparing our results. And there is no chances to make the questions that there is no control variables in the study.

We collected daily time series closing price data for this 8 indices for 12 years starting from 25th Feb 2003. All the data are taken from Thomson-Reuters DataStream database available in Knowledge Management Centre (KMC) of INCEIF University. The stock indices returns were Calculated as differences of the logarithmic daily closing prices of indices $\{\ln(pt) - \ln(pt-1)\}$ where p is an index value.

5.2 Descriptive Statistics:

	DJII	USDI	EUISI	EURI	JPISI	YENI	MYISI	RMI
Mean	0.000262	-5.79E-05	0.000296	4.32E-05	0.000142	-1.30E-06	0.00038	3.29E-06
Median	0.000425	0	0.000549	0	0.000346	0	0.00019	0
Maximum	0.106541	0.0196	0.13578	0.023318	0.106579	0.0564	0.045	0.023
Minimum	-0.0799	-0.0288	-0.11112	-0.0203	-0.0955	-0.0382	-0.0983	-0.0161
Std. Dev.	0.009958	0.003641	0.015594	0.003668	0.013663	0.006553	0.008269	0.003531
Skewness	-0.20032	-0.09997	0.035921	-0.06259	-0.25733	0.446406	-0.95782	0.123242
Kurtosis	15.47144	7.168874	11.47131	5.133199	7.728333	8.824769	15.26569	6.14521
Jarque-Bera	18806.93	2104.129	8669.017	551.5595	2732.55	4194.496	18616.04	1202.252
Probability	0	0	0	0	0	0	0	0
Sum	0.760747	-0.16776	0.857441	0.125288	0.410836	-0.00378	1.101105	0.009529
Sum Sq. D	0.28735	0.038426	0.704732	0.038985	0.541016	0.124445	0.198132	0.036131
Observati	2899	2899	2899	2899	2899	2899	2899	2899

Table-1

From the descriptive statistics table we can see that volatility of return (represented by standard deviation) is highest for the EUISI and lowest MYISI from the Islamic stock indices and from the currency indices YENI is the highest and RMI is the lowest followed by the highest and lowest average returns from the Islamic stock indices and currency indices, which is in line with theory, higher the risk, higher is the return. This standard deviation shows absolute time independent volatility of the return. Skewness indicates asymmetry property of any distribution. Zero skewness leads to symmetry of a distribution. On the contrary, positive skewness refers to an asymmetric distribution with larger tail

inclined to the right and negative skewness refers to an asymmetric distribution with larger tail inclined to the left. The result shows that distribution of all returns for Islamic stock indices are negative except EUII and from currency indices USDI and EURI is negatively skewed and YENI and RMI is positively skewed which indicates that equity return distributions are not symmetric leading to higher variability and risk.

Kurtosis measures fatness of any distribution relative to normal distribution. Measures of kurtosis describe how concentrated the data are around the mean of the distribution. The more peaked or flat is the distribution, the less normally distributed the data are and vice versa. Ideal value of kurtosis is 3 signifying the normality of the distribution, which says the distribution is neither peaked nor flat. Kurtosis value more than 3 indicates leptokurtic (peaked) distribution and the distribution is platykurtic (flat) with a kurtosis value of less than 3. Results show that kurtosis values of all returns series are more than 3 indicating fatness of the distribution (leptokurtic), which indicates that returns are not normally distributed and consequently return variability and risk are higher.

Jarque-Bera test results of all return series are significant, which even further strengthens the non-normality, variability and risk of the returns' distributions.

5.3 Estimates of Multivariate Normal Distribution and T Distribution for all indices:

	Parameter	Multivariate Normal Distribution			Multivariate T Distribution		
		Estimate	Standard	t-Ratio[Prob]	Estimate	Standard	t-Ratio[Prob]
lambda1	EURI	0.9574	0.005284	181.1943 [.000]	0.96025	0.005551	172.9971 [.000]
	YENI	0.94034	0.006758	139.1466 [.000]	0.94987	0.00669	141.9766 [.000]
	RMI	0.89715	0.011205	80.0641 [.000]	0.94374	0.009815	96.1551 [.000]
	USDI	0.94256	0.005685	165.8092 [.000]	0.95715	0.005087	188.1490 [.000]
	EUISI	0.91119	0.00851	107.0700 [.000]	0.93529	0.007931	117.9303 [.000]
	JPISI	0.88934	0.011957	74.3769 [.000]	0.92234	0.009942	92.7716 [.000]
	MYISI	0.91196	0.01066	85.5492 [.000]	0.93321	0.010796	86.4369 [.000]
	DJII	0.91576	0.007946	115.2511 [.000]	0.93005	0.007955	116.9098 [.000]
lambda2	EURI	0.035038	0.003923	8.9314 [.000]	0.03274	0.004122	7.9428 [.000]
	YENI	0.042383	0.004178	10.1439 [.000]	0.035493	0.004275	8.3032 [.000]
	RMI	0.059855	0.005265	11.3685 [.000]	0.037679	0.005143	7.3265 [.000]
	USDI	0.045622	0.004176	10.9240 [.000]	0.034279	0.003713	9.2320 [.000]
	EUISI	0.068456	0.005946	11.5129 [.000]	0.047996	0.005474	8.7684 [.000]
	JPISI	0.084362	0.008338	10.1183 [.000]	0.060287	0.00704	8.5630 [.000]
	MYISI	0.075217	0.0084	8.9547 [.000]	0.057112	0.008602	6.6396 [.000]
	DJII	0.067653	0.005831	11.6022 [.000]	0.054851	0.005838	9.3952 [.000]
	delta1	0.97688	0.001276	765.4817 [.000]	0.97552	0.001533	636.3637 [.000]
	delta2	0.017269	7.48E-04	23.0811 [.000]	0.017851	8.77E-04	20.3590 [.000]
	df				8.5529	0.35812	23.8831 [.000]
	Max. Log-Likelihood			90704.2			91421.9

Table-2

Table 2 presents Estimates of Multivariate Normal Distribution and Multivariate T Distribution for all indices for the maximum likelihood estimates, Volatility Parameters and Mean reverting parameters.

We can see that all the volatility parameters are highly significant from both normal and t distribution, which implies gradual volatility decay such as riskiness of the returns gradually decays resulting from a shock in the market. The maximised log-likelihood value for the case of t-distribution (91421.9) was larger than that obtained under the normality assumption (90704.2). In addition, the estimated degree of freedom for the t-distribution (8.5529) which is below 30; and any other value one would expect for a multivariate normal distribution. This suggests that the t-distribution is more appropriate in capturing the fat-tailed nature of the distribution of index returns. Therefore, the analysis will work with the t-distribution estimates.

5.4 Volatility Decays:

Indices	λ_1	λ_2	$\lambda_1+\lambda_2$
EURI	0.96025	0.03274	0.99299
YENI	0.94987	0.035493	0.985363
RMI	0.94374	0.037679	0.981419
USDI	0.95715	0.034279	0.991429
EUISI	0.93529	0.047996	0.983286
JPISI	0.92234	0.060287	0.982627
MYISI	0.93321	0.057112	0.990322
DJII	0.93005	0.054851	0.984901

Table-3

Table-3 shows the volatility decays estimation, where we can see that Even if we add lambda 1 and lambda 2 for each indices respectively, we found the result is less than 1, which is actually less than unity, implies that the volatility of all these indices return is not following (IGARCH), which says the shock to volatility is not permanent. This result has very important implications as the volatility is not going to be permanent following a shock in the economy. If volatility is permanent and does not die out, investors and portfolio managers would have a high chance of losing their investment even though they may make higher profit in the short run. Apart from genuine investors and portfolio managers, speculators would welcome this situation for their own interest. Therefore, it seems we found the probability that besides currency market indices all the Islamic indices would be a safer investment instrument for both muslim and non-muslim investors in their portfolio management.

5.5 Estimated unconditional volatility and correlation matrix for all indices

Unconditional Volatility and Correlation Matrix

	EURI	YENI	RMI	EUISI	JPISI	MYISI	DJISI	USDI
EURI	0.003667	-0.08741	-0.29184	0.40698	0.10585	0.039008	0.22926	-0.64606
YENI	-0.08741	0.006552	-0.50587	-0.37796	0.099469	-0.20612	-0.35683	-0.037397
RMI	-0.29184	-0.50587	0.0035303	0.025996	-0.0373	0.22139	0.070844	0.2705
EUISI	0.40698	-0.37796	0.025996	0.015594	0.23885	0.26204	0.7913	-0.605
JPISI	0.10585	0.099469	-0.037301	0.23885	0.013662	0.33468	0.21175	-0.34373
MYISI	0.039008	-0.20612	0.22139	0.26204	0.33468	0.0082758	0.20688	-0.17593
DJISI	0.22926	-0.35683	0.070844	0.7913	0.21175	0.20688	0.0099594	-0.42837
USDI	-0.64606	-0.0374	0.2705	-0.605	-0.34373	-0.17593	-0.42837	0.0036412

Red-Diagonal U. Volatility Matrix

Green- currency Index to currency Index correlation

Blue- Islamic Stock index to Islamic Stock Index Correlation

Purple- Currency Index to Islamic Stock Index Correlation

Table-4

Table 4 presents the estimated unconditional volatilities and unconditional correlations between all the indices returns. The off diagonal elements represent unconditional correlation, which also can be termed as covariance and diagonal elements represent unconditional volatilities. From the results we can see

that the unconditional volatility is highest for the EUI SI and lowest MYISI from the Islamic stock indices and from the currency indices YENI is the highest and RMI is the lowest followed by the highest and lowest average returns from the Islamic stock indices and currency indices respectively, which is in line with theory, higher the risk, higher is the return. But these unconditional volatilities of all the indices showing the stability and instability of the returns respectively. DJISI is a worldwide Islamic stock index showing low volatility may be attributed to lower leverage in Islamic stocks and relatively lower responsiveness to changes in mainstream equity markets. In this table it's clear that EUI SI is the highest volatile Islamic stock index and the currency index of Euro area (EURI) became 2nd lowest volatile from the currency indices and if we look at the JPISI which is the 2nd lowest volatile from all Islamic stock indices and the Japanese (YENI) became the highest volatile from the currency indices. The lowest volatile Islamic stock index from this table MYISI, where the lowest volatile currency RMI for the same country in this table. This view for the highest and lowest volatility between the currency market and Islamic stock market probably indicating us that there is a strong relationship in this two market. If we keep an sharp eye on this two market we can get better implications for our portfolio diversification in all these markets. We will have a more deeper explanation as follows:

The off diagonal elements in the table represent unconditional correlation of all the indices, it showing us the unconditional correlation in three ways: currency index to currency index, Islamic stock index to Islamic stock index and currency index to Islamic stock index. If we look at the currency index to currency index unconditional correlation, we can see that all of the currency indexes are negatively correlated except RMI and USDI. This may be a better indication for the Malaysian investors or for the investors from those countries to look for currency hedge or investment diversification opportunities between them. Anyway we can see the magnitude of currency index unconditional correlation as follows:

1-EURI/USDI(-0.64606). 2-YENI/RMI(-0.50587). 3-EURI/RMI(-0.29184).
4-EURI/YENI(-0.08741). 5-USDI/YENI(-0.0374). and 6-RMI/USDI(0.2705).

All the Islamic stock indices are showing positive unconditional correlation among them, the magnitude of correlation as follows:

1-EUII/DJII (0.7913). 2-JPISI/MYISI(0.33468). 3-EUII/MYISI(0.26204).

4-EUII/JPISI(0.23885). 5-DJII/JPISI(0.21175). and 6-DJISI/MYISI(0.20688).

Interestingly, if we compare the magnitude of currency indices to the Islamic stock market indices, it's very clear that the negatively correlated magnitudes of currency indices are naming the positively correlated magnitude of Islamic stock indices in the same sequence. From based on this result, can we say that the correlation between Islamic stock indices from two different countries are showing the cross currency correlation for that two specific country? Actually negative correlation result showing the similarities with some empirical studies done by Kim (2003), Ibrahim and Aziz (2003) They concluded that the relation between stock and foreign exchange markets is negative; when domestic currency depreciates, the stock prices will also decrease. Anyway, the most important indication we need to find from here is that are we gaining or losing from this relationship between the currency market and Islamic stock market. So, the portfolio managers must be more careful about this negative correlation between the currency rates and stock prices where they can have high volatility in their currency because of changes in the economy of that country or if any incident or crisis bring changes to that economy. To observe the relationships between the stock and foreign exchange markets, this paper shows the unconditional correlation matrix between the returns of stock price index and exchange rate indices. The correlations that stand for the relationship between two variables in four countries are all negative except MYISI and DJISI and currencies of these two countries. This may be showing the same result that the increase (decrease) of the returns of stock price index is done by decrease (increase) of the exchange rates, which causes from the domestic currency appreciate (depreciate). If we look at the paper of i-chun T-Sai (2012) we can see that they found that The coefficients that stand for the relationship between two variables in six countries are all significantly negative. This means the increase (decrease) of the returns of stock price index will decrease (increase) the exchange rate, causing the domestic currency to appreciate (depreciate) or vice versa. His results support the portfolio balance effect, in which the negative relationship is never a surprise. Anyway, to find deeper correlation between the cross currency relationship to the Islamic stock indices, we have arrange The magnitude of unconditional correlation among the Islamic indices and currency indices are as follows:

The magnitude for the investor from USA:

1-EUII/RMI(0.025996). 2-JPISI/USDI (-0.34373). 3- MYISI /USDI(-0.17593).

4-DJISI/USDI(-0.42837).

The magnitude for the investor from Euro:

1-EUISI/EURI(0.40698). 2-DJISI/EURI(0.22926). 3-JPISI/EURI(0.10585).

4-MYISI/EURI(0.039008).

The magnitude for the investor from Japan:

1- JPISI/YENI(0.099469). 2-MYISI/YENI(-0.20612). 3-DJISI/YENI(-0.35683).

4-EUISI/YENI(-0.37796).

The magnitude for the investor from Malaysia

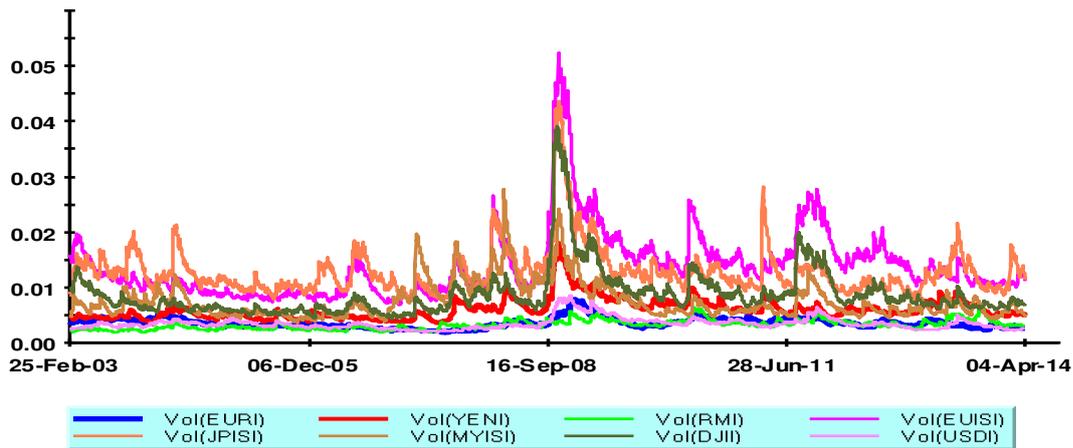
1- MYISI/RMI(0.22139). 2-DJISI-RMI(0.070844). 3-EUISI/RMI(0.025996).

4-JPISI/RMI(-0.0373).

I have arranged the sequence for the cross currency correlation (whether positive or negative) to the Islamic stock indices for all these different countries. If we compare the relationship of different currency indices to the Islamic stock indices of different countries, we can see that the correlation between them varies a lot from highly positive correlation to the highly negative correlation or some countries' currency are having closer to zero correlation to the other country's Islamic stock indices. Which shows us the similarities of the results which has mentioned in our literature review from previous authors, where they found different results like no correlation, negative correlation and positive correlation between currency to the stock indices. Some of the authors found short or long term correlation between currency and stock indices, to find this out I will go more deep experiment as follows.

The following figure 1 portrays conditional volatilities of currency market indices and the Islamic equity indices returns undertaken by this study. These volatilities are conditional upon the information available in the market up to t-1 period.

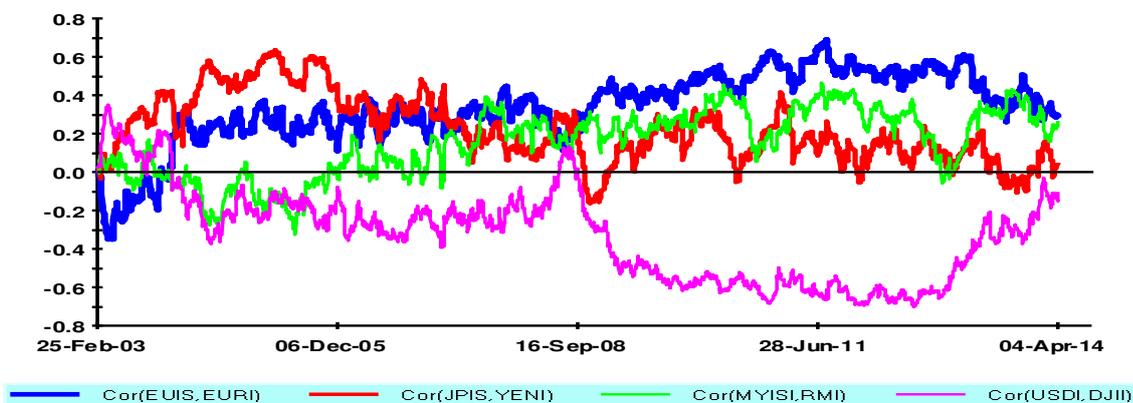
Plot of conditional volatilities and correlations



6.6 Fig. 1: Plot of the Conditional Volatilities of returns (All indices).

From the above figures, it would be easier to observe that the conditional volatilities of currency indices are very low compare to all Islamic indices returns where they move more or less simultaneously except around 2002, 2008 and from the end of 2011 to the end of 2013 where we can see that EUISI, JPISI and DJISI is more volatile during the subprime crisis of 2008 and subsequent sovereign debt crisis of EURO. If we look at the volatility of Japanese currency YENI and Malaysian Islamic stock index MYISI, we can see that the volatility is almost the same all over the period between these two indexes. The low volatility of MYISI and RMI is actually showing how stable the return from this Islamic stock index, it may be a good observation for the other country investors to have a look at it and invest in Malaysian Islamic stocks.

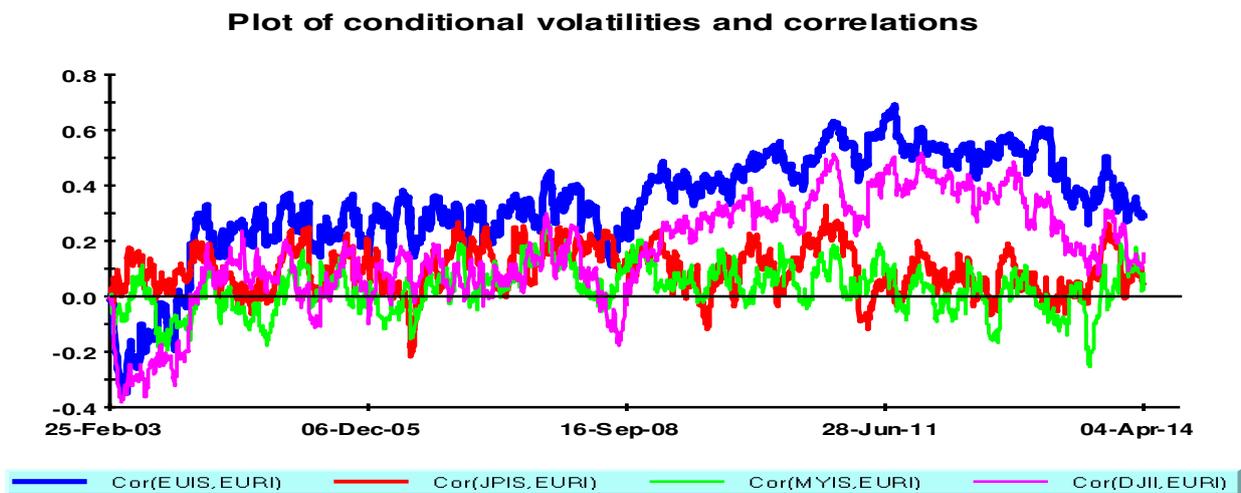
Plot of conditional volatilities and correlations



6.7 Fig. 2: Plot of the Conditional Correlation of returns (All indices).

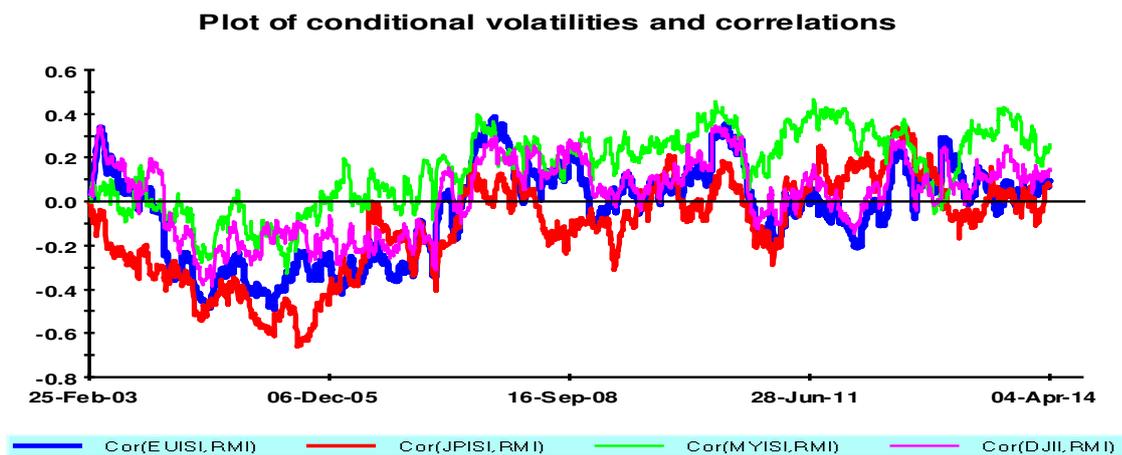
From the above plots, we observe the swings of the conditional correlations between returns of Islamic indices and currency indices are more volatile. Three pairs are showing positive correlation among them

and DJISI and USDI pair showing highly negative correlation it may be due to strong financial integration between these two markets. We can see that the correlation between them are varies based on different periods such as 2002 to middle of 2008 the correlation was not so volatile and after the crisis from 2008 it shows more volatile. The correlation in returns between the Malaysian Islamic stock index and currency index is shown positive and very low volatile. The following few graphs will make more clear about the correlation among stock indices and currency indices from different countries:



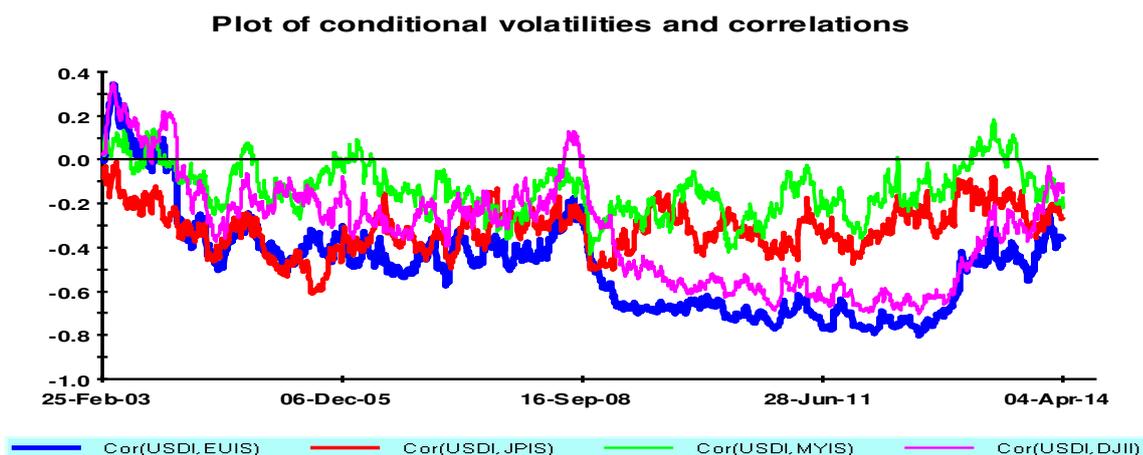
6.8 Fig. 3: Plot of the Conditional Correlation of returns (All Islamic stock indices with EURI).

If we look at the figures at 3, 4, 5 and 6. We can see that the correlation based on stock indices to the different country currencies. In figure 3, the correlation between EUIS/EURI and DJIS/EURI shows more volatile which starts from -0.40 2003 to 0.20 in middle of 2008. When the big financial crisis hit in 2008 it starts increasing again and reach till 0.60 till the end of second financial crisis it stays in high. This indicates very less portfolio diversification chances for these two country's currencies and Islamic stock index because of high volatility in finance market because of financial crisis. The correlation between the JPIS/EURI and MYIS/EURI was quite closer to zero which shows better portfolio divarication chances from Euro to Japan Islamic stock index and Euro to Malaysia Islamic stock index.



6.9 Fig. 4: Plot of the Conditional Correlation of returns (All Islamic stock indices with RMI).

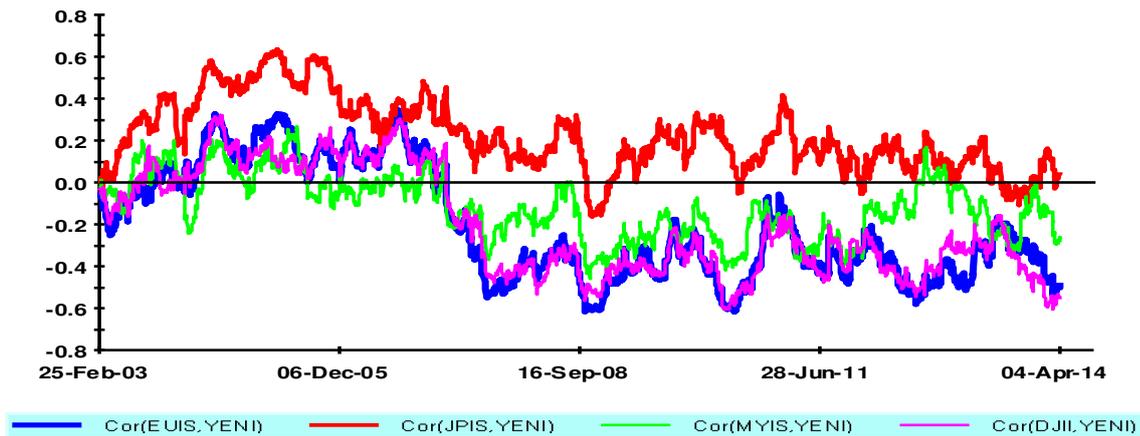
The correlation between all Islamic stock indices and RMI in figure 4 shows that it was less volatile and was negative before the middle of 2008. After that period when the financial crisis kicks in, it shows positive and very less correlation between the Islamic stock indices.



6.10 Fig. 5: Plot of the Conditional Correlation of returns (All Islamic stock indices with USDI).

The correlation between Islamic stock indices and currency indices shows highly negative USDI, it was less negative but less volatile before the subprime crisis, when the crisis hit in 2008, the correlation between them became more volatile and negative till the end of sovereign debt crisis. This may be indicating that the stock market correlation was very highly negative with USDI between all these countries for all these time. For being the highly traded currency in the whole world and the currency of bigger financial market of this world it shows the negative correlation with all Islamic stock indices because of being highly integrated with the world economy.

Plot of conditional volatilities and correlations



6.11 Fig. 6: Plot of the Conditional Correlation of returns (All Islamic stock indices with YENI)

The correlation between Islamic stock indices and Japanese currency YENI showed us a good portfolio diversification after the year 2005, where we can see that all the correlations became negative and the correlation between Japanese Islamic index and YENI is still positive and closer to zero.

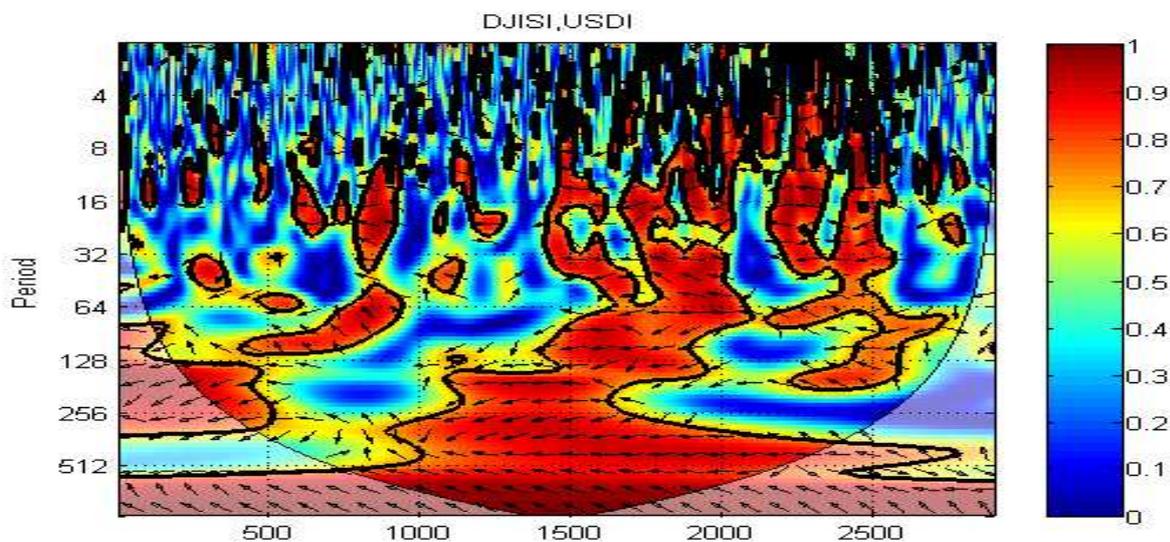
From our MGARCH T-DCC results we can see that there is a relationship among the currency market and Islamic stock market whether it may be positive or negative at different times. But we didn't get any indication that the correlation between them is short term or long term relation where the different studies have shown different contradictory opinion about this. To get better understanding for the relation between these two markets, we will use wavelet analysis (CWT AND MODWT) to see whether the relation between Islamic stock indices and currency market indices is short term, long term or time variant.

6. CWT analysis for Islamic stock indices and currency stock indices:

Figures 7, 8,9 and 10 present the estimated continuous wavelet transform and phase difference of Islamic stock indices returns with currency rate indices returns for those four different countries from scale 1(one day) up to scale of 8 (approximately two market years, 512 days). In the Cross-wavelet coherency figures, the black contour designates the 5% significance level estimated from Monte Carlo simulations using phase randomized alternate series. The colour code for power ranges from blue (low coherency, near zero) to red (high coherency, near one). The arrows those pointing to the right mean that the variables are in phase. To the right and up with the first series lagging. To the right and down with the first series leading. Arrows pointing to the left mean that the variables are out of phase. To the

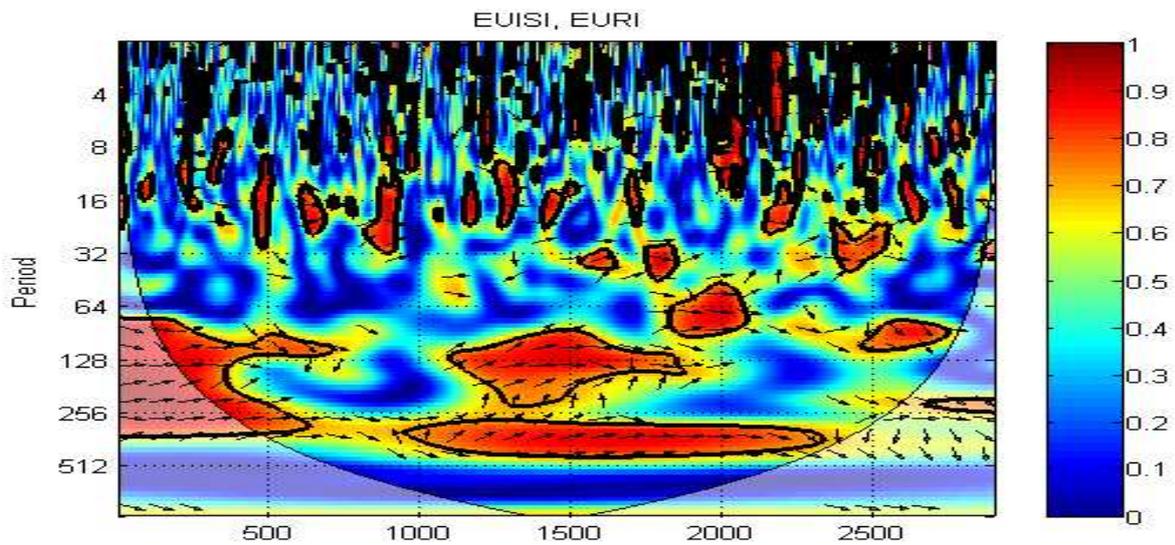
left and up with the first series leading. To the left and down with the first series lagging. The cone of influence, indicating the region affected by edge effects, is shown with a thin line.

In these figures we can see the continuous wavelet coherence of the four pair indices from home currency indices and Islamic stocks under analysis. Looking at the time scale decomposition of these variables some interesting facts are revealed. Most of the action in the indices occurred at high scales (low frequencies). There are clear and general structural changes occurring for all the series at different time scales in the years under analysis since the red power is spread through all of them in different scales. However some interesting aspects deserve to be mentioned:



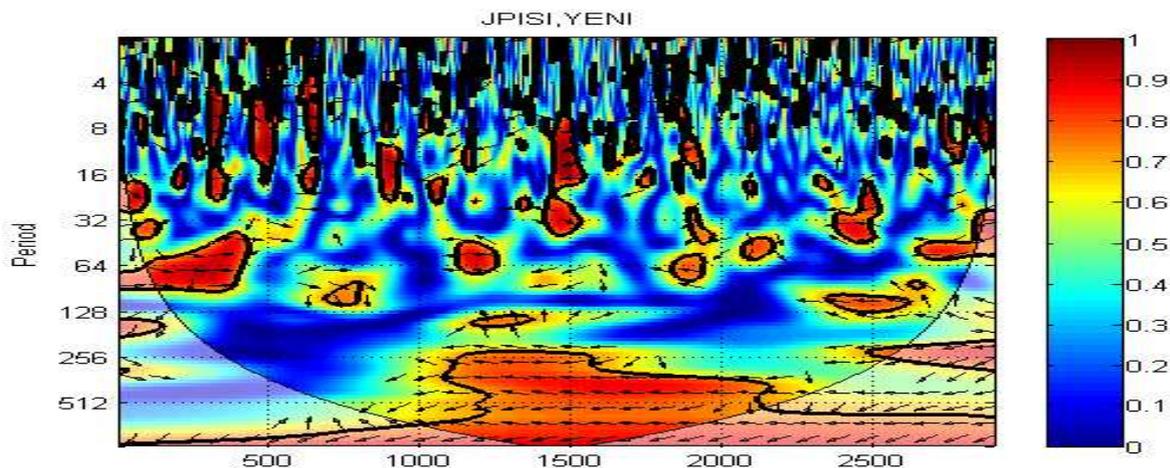
7.1 Figure 7: DJISI/USDI INDEX (CWT)

The wavelet coherence is used to identify both frequency bands and time intervals within each pairs of indices are co-varying. The arrows pointing left in all over the scales and highly coherence areas, which means that the pair was out of phase. On the daily time scales of 16-128 days band, the 5% significance regions indicate that stock market indices under analysis showing high coherence and leading the USDI above 128 days band until 1000 (end of 2006). From 1350 (2008) to 2000(2010) at the band of 64 to 512 band, we can see that USDI was leading DJISI during the period of subprime financial crisis. Which indicate that DJISI was strongly correlated with USDI in that period, it has absorbed whatever the affects came from the currency economy. This same action repeated again from 2300 to 2750 (2012 to 2013end) at 4 to above128days band because euro sovereign debt cause the financial crash again. We notice here that impacts of financial crisis from 2008 entered into the higher 8th scales into the deep but the crisis from 2012 was not so strong which reaches the band of a bit higher than 7th scale (256band).



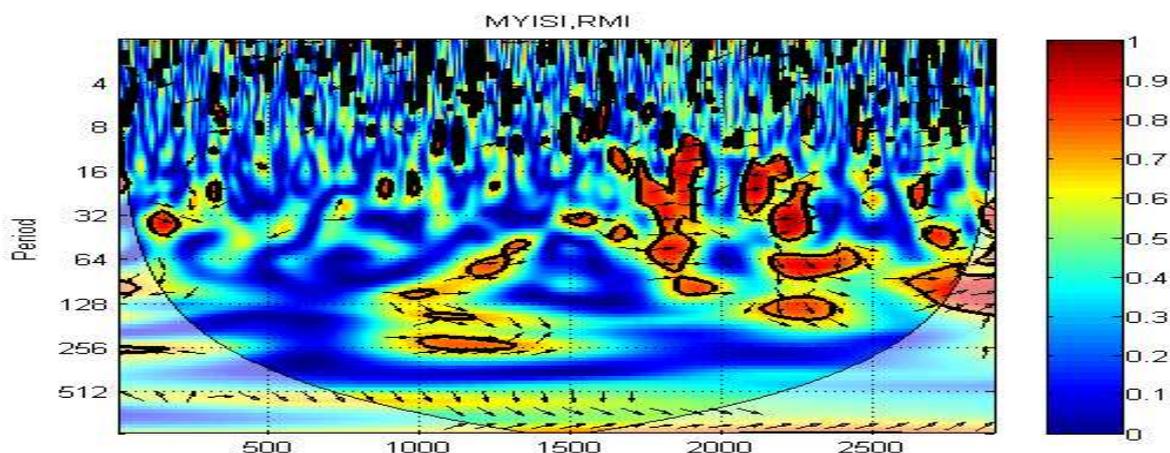
7.2 Figure 8: EUI, EURI (WTC):

Looking at figure 8, the wavelet coherency we see some statistically significant regions. The wavelet coherency between the EUI and the EURI is high at large scales (above the 65 days band) and below 64 days band we also see several statistically significant islands before 2000 (2011). But right after 2011 we can see there are many statistically significant islands which is below 128 days band till the end of 2013. Which indicates that euro sovereign crisis affected the low scale areas. The higher scale areas are badly affected from the subprime crisis where the affects starts from 1250 (2007) to 2350 (2012) at the scale of 7th to 9th which reaches the Euro Sovereign debt crisis. In both these crisis period we can see that most of the time EURI was leading and EUI was lagging. This indicates that there is a high integration in the currency and the whole economy, while the economy is affected by financial crisis the currency got to change itself according to the new adjustments to the economy and the financial markets.



7.3 Figure 9: JPISI,YENI (WTC):

Looking at figure 9, in the wavelet coherence we can see some small red islands which are statistically significant regions in low scale areas(scale 2 to 5). There is not much high coherence in the pair in the low scale area during all over the periods. In the high scale area 256days to 512 days band, we can see that there was high correlation in the pair during the subprime crisis from 2008 to 2010. The arrows indicates that the relationship was out of phase in that period while sometimes JPISI was leading. This indicates that may be the investors were moving to Islamic stocks because of the effects of subprime financial crisis which causes the conventional finance down.



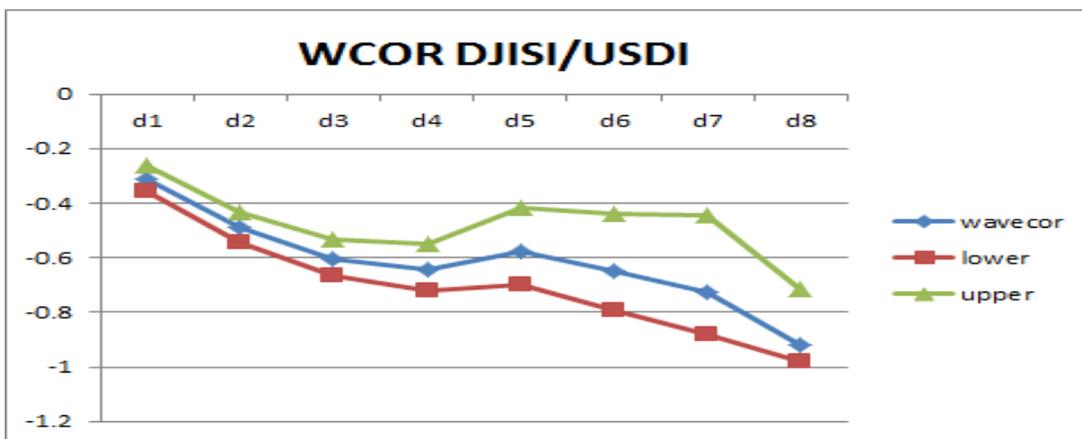
7.4 Figure 10: MYISI,RMI (WTC):

MYISI,RMI Wavelet Coherence figure showing us few red islands from 64 day to 256days band during the subprime financial crisis at 5% significant level. The coherency was not so long and not so strong for this pair in that period which is indicated by very light red colour. There are few more small islands which is in deep red colour showing high coherency in this pair during the period of euro debt crisis. This pair shows better portfolio diversification with more stability among these four pairs.

Several other things deserve a more special attention for all the pairs, we have that at high scales (low frequencies) index returns show a strong significant relation and in most of the cases we have a phase relationship among the analysed indices. Some arrows, in the phase analysis point right and down meaning that the relationship was not homogeneous across scales. The determination of diversification strategies by an international investor also depends on the nature and magnitude of the relationships existing between different stock markets. As such, it is important for international investors to understand the interrelations between the currency index and Islamic stock index to diversify risk and to derive high return, and with these results we hope to provide good strategies for individual market investor's to compose their international stock portfolios. From the cwt analysis, we found that the correlation among currency and stock markets are time variant and based on economic conditions. To make our findings more clear we will use the MODWT as robustness test for this study:

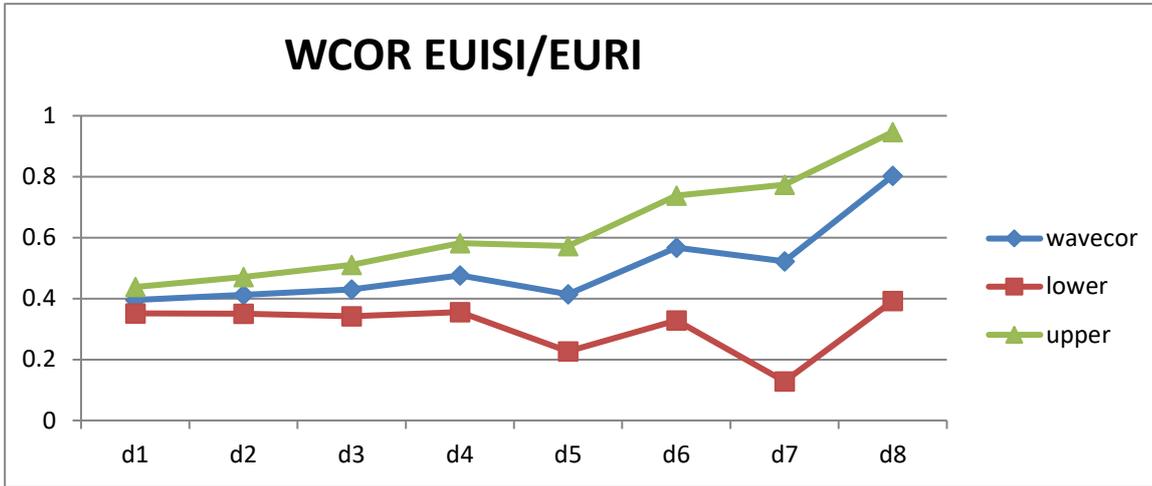
7. MODWT results and discussion for robustness test:

Wavelet Correlation for robustness test:



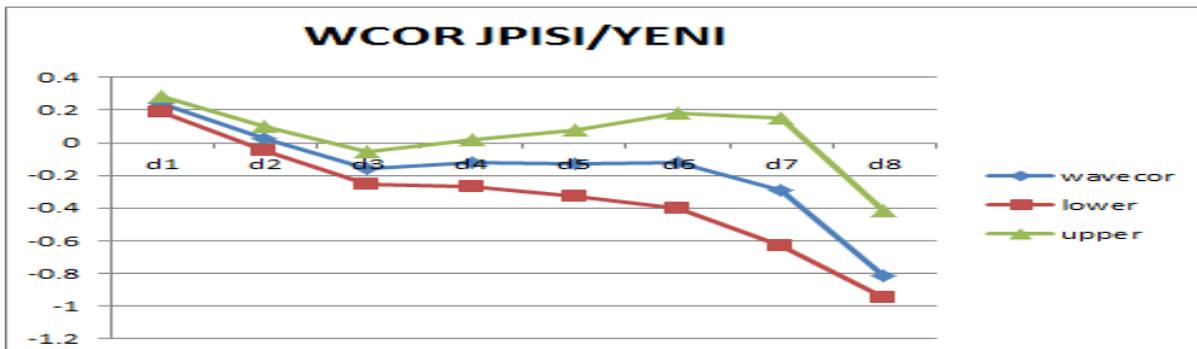
8.1 Figure-11: WCOR DJISI/USDI

Figure-11 reports the wavelet correlation to examine the magnitude of the pair DJISI and USDI, where the chart showing us the clear view of the highly negative correlation between DJISI and USDI. The magnitude of the negative correlation increases as the time scale increases from d1 to d8.



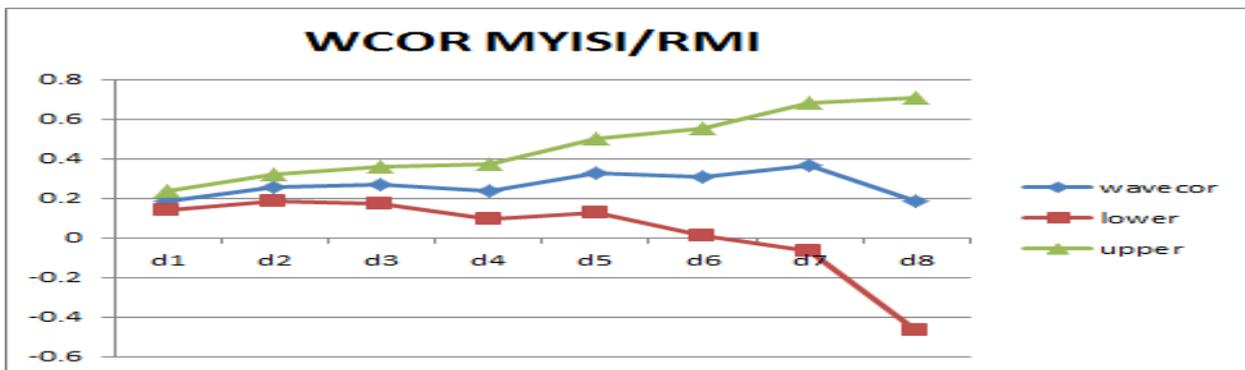
8.2 Figure-12: WCOR EUISI/EURI

Figure-12 reports the wavelet correlation to examine the magnitude of the pair EUISI and EURI, where the chart showing us the clear view of the highly positive correlation between EUISI and EURI. The magnitude of the positive correlation increases as the time scale increases from d1 to d8.



8.3 Figure-13: WCOR JPISI/YENI

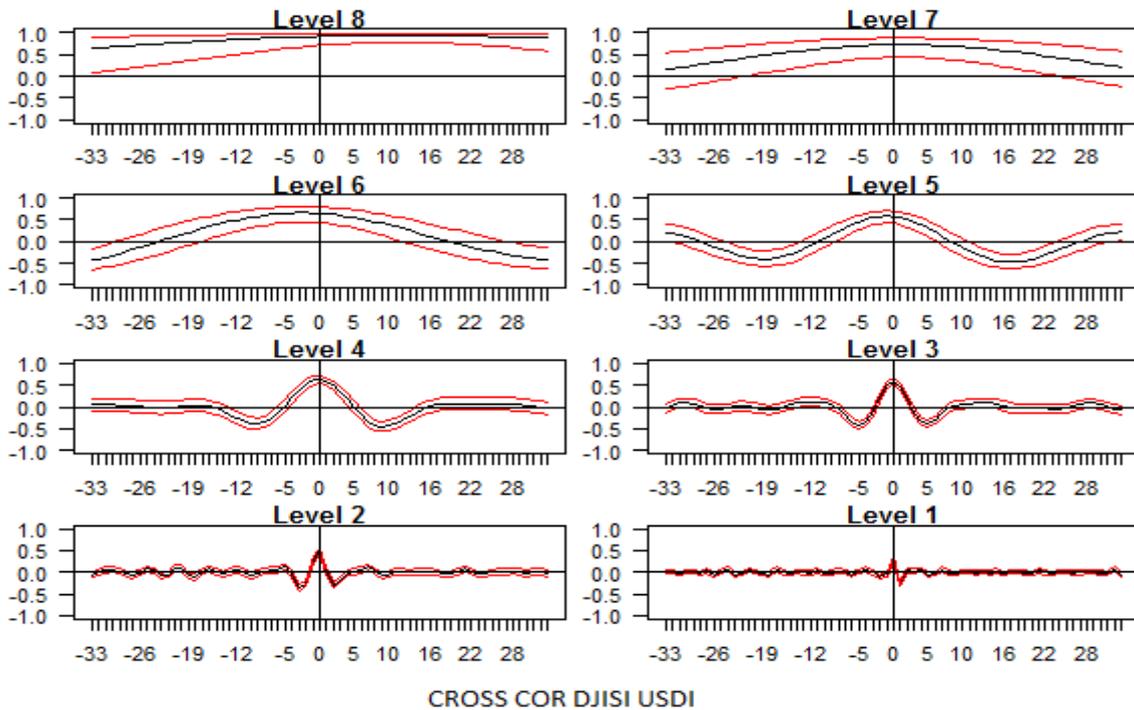
Figure-13 reports the wavelet correlation to examine the magnitude of the pair JPISI and YENI, where the chart showing us that the correlation was positive area till the scale d1 to d2. Then from d2 to d6 the correlation was negative but almost closer to zero and after that from d6 it starts decreasing and reaches to the sharp negative relationship till d8.



8.4 Figure-14: WCOR MYISI/RMI

Figure-14 reports the wavelet correlation to examine the magnitude of the pair MYISI and RMI, where the chart showing us the clear view of the positive correlation between MYISI and RMI from scale d1 to d7 after that the correlation starts moving to zero. The magnitude of the positive correlation increases at a slow space as the time scale increases from d1 to d7.

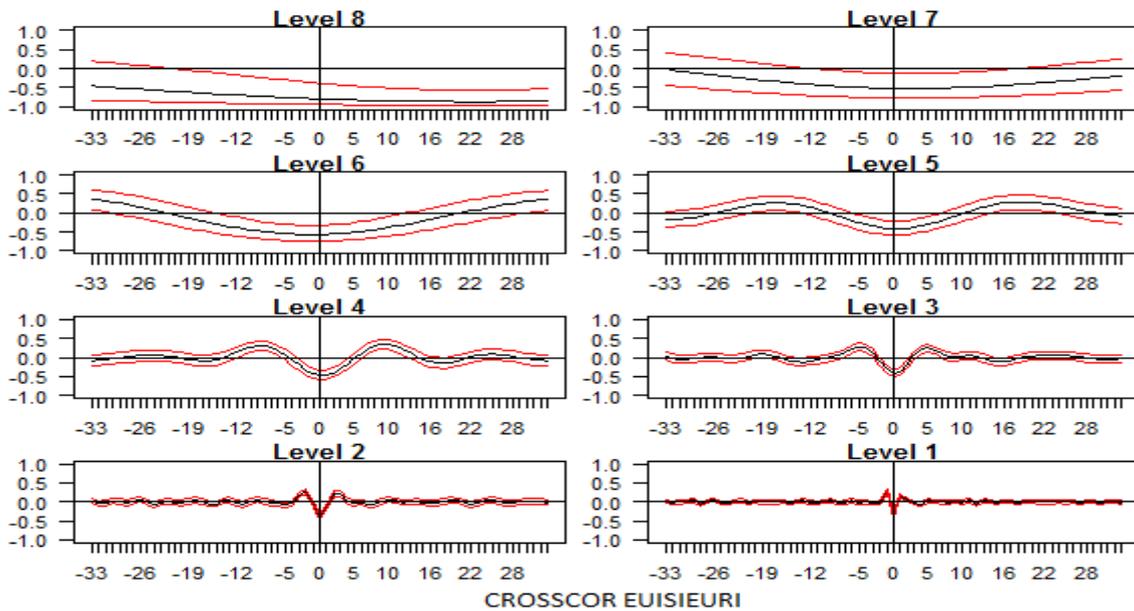
8. Wavelet Cross Correlation for robustness tests:



9.1 Figure-15: CROSS CORRELATION DJISI/USDI

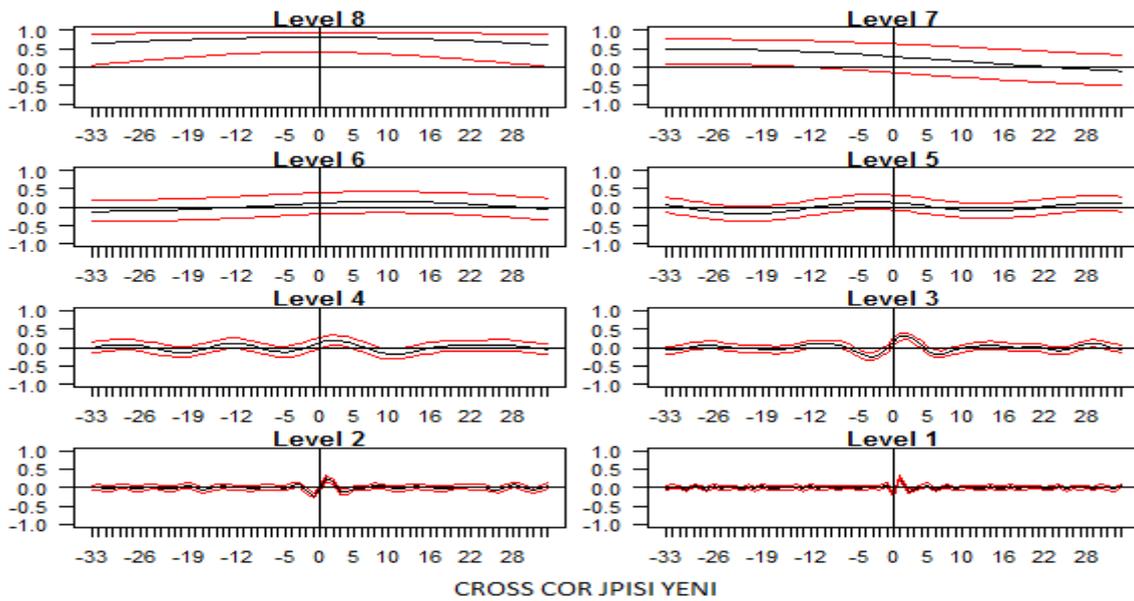
Fig. 15 illustrates the wavelet cross correlation between DJISI and USDI at eight levels of decomposition. As observed, at the low level scale from level-1 to level-3 the short- and medium-term fluctuations of both variables are more closely correlated than those in the high level scales over the long-term with a 33-days lead and lag, and therefore, the magnitude of the cross correlation becomes smaller by increasing the frequency band at the low level scale, so, not many significant correlation can be observed for the very-long-run interval, except for 2 days lead significant negative correlation nearby 0 days for level-1, level-2 got 8 days lead and lag significant negative correlation, level-3 got 10days negative and 5days positive lead and lag significant correlation, level-4 got 10days negative and 10days positive lead and lag significant correlation, level-5 got 20days negative and 22days positive lead and lag significant correlation, level-6 got 4days negative and 30days positive lead and lag significant correlation, level-7 got 0days negative and 42days positive lead and lag significant correlation and level-8 got 0days negative and 66days positive lead and lag significant correlation. From this cross correlation observation we can notice that as levels of scales keeps on increasing, the positive correlation between

the pair is increasing and negative correlation was decreasing. This indicates that this pair shows negative correlation in the low level high frequency scales for short term and positive correlation in the high level and low frequency scales for long term.



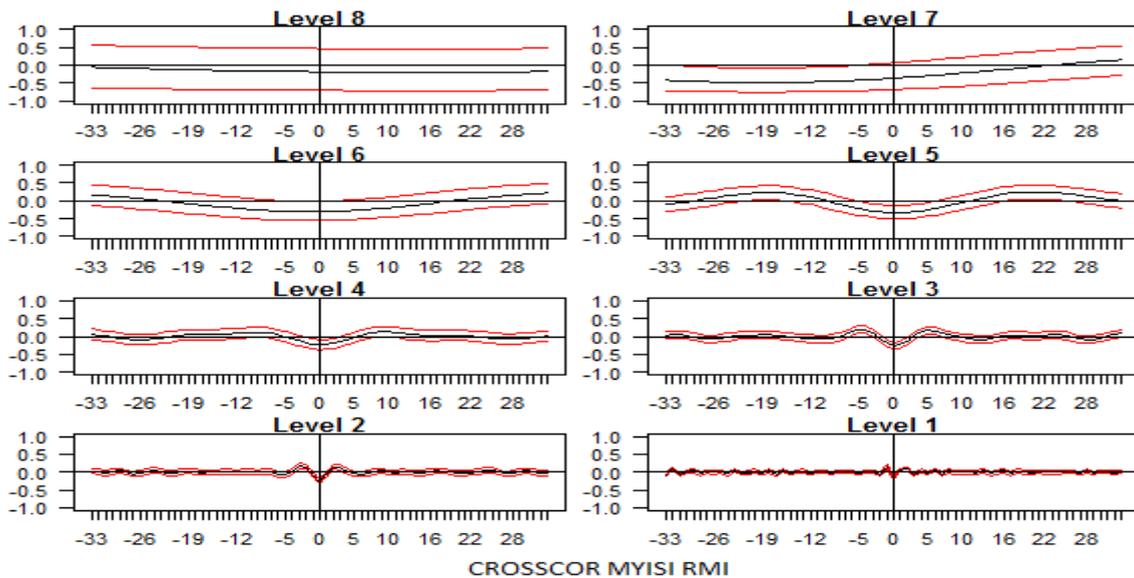
9.2 Figure-16: CROSS CORRELATION EUISI/EURI

Fig. 16 illustrates the wavelet cross correlation between EUISI and EURI at eight levels of decomposition. As observed, at the low level scale from level-1 to level-3 the short- and medium-term fluctuations of both variables are more closely correlated than those in the high level scales over the long-term with a 33-days lead and lag, and therefore, the magnitude of the cross correlation becomes smaller by increasing the frequency band at the low level scale, so, not many significant correlation can be observed for the very-long-run interval, except for 2 days lead significant negative correlation nearby 0 days for level-1, level-2 got 3 days negative and 2 days positive lead and lag significant correlation, level-3 got 4days negative and 4days positive lead and lag significant correlation, level-4 got 18days negative and 6days positive lead and lag significant correlation, level-5 got 12days negative and 8 days positive lead and lag significant correlation, level-6 got 25days negative and 4days positive lead and lag significant correlation, level-7 got 35days negative and 0days positive lead and lag significant correlation and level-8 got 60days negative and 0days positive lead and lag significant correlation. From this cross correlation observation we can notice that as levels of scales keeps on increasing, the negative correlation between the pair is increasing and positive correlation was decreasing. This indicates that this pair shows positive correlation in the low level high frequency scales for short term and negative correlation in the high level and low frequency scales for long term.



9.3 Figure-17: CROSS CORRELATION JPISI/YENI

Fig. 17 illustrates the wavelet cross correlation between JPISI and YENI at eight levels of decomposition. As observed, at the low level scale from level-1 to level-4 the short- and medium-term fluctuations of both variables are more closely correlated than those in the high level scales over the long-term with a 33-days lead and lag, and therefore, the magnitude of the cross correlation becomes smaller by increasing the frequency band at the low level scale, so, not many significant correlation can be observed for the very-long-run interval, except for 1 days lead significant positive correlation nearby 0 days for level-1, level-2 got 2 days negative and 1 days positive lead and lag significant correlation, level-3 got 4days negative and 2days positive lead and lag significant correlation, level-4 got 3days negative and 1days positive lead and lag significant correlation, level-5 got 4days negative lag significant correlation, level-6 got no significant correlation, level-7 got 21days positive lag significant correlation and level-8 got 66days positive lead and lag significant correlation. From this cross correlation observation we can notice that at low to medium levels of scales it has very less times significant correlation at high levels scale positive correlation keeps on increasing. This indicates that this pair shows less number of negative or positive correlation in the low level high frequency scales to medium level scale medium frequency scales for short term and positive correlation in the high level and low frequency scales for long term.



9.4 Figure-18: CROSS CORRELATION MYISI/RMI

Fig. 18 illustrates the wavelet cross correlation between MYISI and RMI at eight levels of decomposition. As observed, at the low level scale from level-1 to level-4 the short- and medium-term fluctuations of both variables are more closely correlated than those in the high level scales over the long-term with a 33-days lead and lag, and therefore, the magnitude of the cross correlation becomes smaller by increasing the frequency band at the low level scale, so, not many significant correlation can be observed for the very-long-run interval, no significant correlation for level-1, level-2 got 1 days negative and 2 days positive lead and lag significant correlation, level-3 got 2 days negative and 4days positive lead and lag significant correlation, level-4 got 3days negative and 9days positive lead and lag significant correlation, level-5 got 8days negative and 14days positive lead and lag significant correlation, level-6 got 15 days negative lead and lag significant correlation, level-7 got 33days negative lag significant correlation and level-8 got no significant correlation. From this cross correlation observation we can notice that as levels of scales keeps on increasing from short term to medium term the positive and negative correlation was decreasing slowly. Then medium term to medium high negative correlation starts increasing and positive correlation became zero. This indicates that this pair shows negative correlation in the low level high frequency scales to medium high scales and positive correlation from low level scale to medium level scales and there is no significant correlation in the long term high level scale.

9. Conclusion:

This paper aims to examine the relationship of the Islamic stocks and currency rates and tried to answer three research objective questions as follows:

1. What is the relationship between Islamic equity prices and exchange rates?
2. What is the impact of exchange rate changes to the Islamic equity market?
3. Should the Islamic equity market investors consider the exchange rates volatility while diversifying their portfolio across the international markets?

Before we continue answering these questions, we just need to mention that Islamic finance sector is just a sub section of the whole financial system whereas the money market is related to the whole financial system. And Islamic financial sector is not so big at this moment that it can have big impact or crash the money market of the financial system. So, the question is what is the ability of the Islamic financial system now? The answer is that Islamic finance sector is behaving as usual as the whole financial systems behaves. It's just walking together with the whole financial system with some own characteristics, the reason for mentioning all these things is that in our study, we have seen that sometimes Islamic stock prices are leading the currency rates, it doesn't mean that Islamic stocks are impacting the currency market in that period, what it means is that it is having higher returns in that period from the relationship it has with the currency market. Anyway, we just continue with the conclusion of this study by answering these three research objective questions, mentioning the weaknesses of this study and possible future analysis in this field as follows:

From our study, we found that there is a relationship (conform with study of the first clue for correlation between exchange rates and stock prices provides Aggarwal (1981)) with the Islamic stock prices and the currency rates and they are correlated and the relationship shows different characteristics at different times based on the situations or economic conditions. But most of the time we found that there is a negative relationship between this two. It shows similarities with some empirical studies done by Kim (2003), Ibrahim and Aziz (2003) They concluded that the relation between stock and foreign exchange markets is negative; when domestic currency depreciates, the stock prices will also decrease. Even though, sometimes we found that the relationship is positive between them. This result also conforms with I-Chun Tsai (2012) they found that the relation of these two markets in Asia, which indicates that the negative relation between stock and foreign exchange markets is more obvious when exchange rates are extremely high or low. However, there are times we found no correlation or correlation close to zero

which support the theory of asset market models by Frenkel (1976) he supports the absence of any relationship between exchange rates and stock prices. There are some contradictory results from different authors regarding the duration of the relationship whether short term, long term or time variant. After getting the results from my study, we found that there are relationships sometimes in short term, sometimes in long term, it depends specially on the condition of the economy, country and many things. I just didn't find anything to say certainly that the relationship is very short term always for this pair or long term for that pair. What we found is that the financial market is a whole body; currency market and stock market are just a part of this body and they are correlated always. Even though, sometimes we notice that they are not walking together it doesn't mean that if there is a hit in the financial market or if there is any big changes in one (currency/stock) the other one will not respond. What we found in our study is that both these markets respond to each other based on degree of changes in each other or in the economy as an example we can mention about the subprime crisis where we can see the impact on currency and Islamic stock market in high scales, where during the Euro debt crisis we can see the impact on currency and Islamic stock market in low scales. So, we just can say that the relationship is time variant based on the degree of changes or degree of impact in each other in different countries according to their economic policy and conditions. This finding conform with Hodrick (1990) argued that it is not so much the movement of either these two markets that particularly affects the other, but that it is the underlying economic fundamentals. Athanasios Tsagkanos, Costas Siriopoulos (2013), exhibit a causal relationship (based on different country policy) from stock prices to exchange rates that is long-run in EU and short-run in USA.

To answer the second question, we will say based on our results that if there is any changes in the currency rates because of any reason, Islamic stock prices will have to show its response to the changes always even though it has its own different characteristics. Because they are depending on each other and it's not that Islamic stock market has their own different currency to avoid the impact of conventional finances. Why we are saying this way is that we have seen many financial crisis till today and from our results its very visible that Islamic stock market had to absorb the impact of those crisis. If we look at the subprime crisis and sovereign debt crisis, these things were just unsettled interest based loans to the people and governments which brings the crisis in and hit which causes many changes in the currency market to the stock market, even though we can see that the impacts is a bit less in Islamic

stock market for having less debt based characteristics which attract many investors to invest in Islamic stocks but we need to prove it through empirical analysis.

To answer the third question, we will say that yes, the Islamic equity market investors should consider about the exchange rates volatility while diversifying their portfolio to the international markets because we found that the changes in currency rates can cause changes to the Islamic stock prices which can cause loss to the investors at the end. So they need to find a stable currency market to move the portfolio diversification. Kim (2003), Ibrahim and Aziz (2003) They concluded in their study that the relation between stock and foreign exchange markets is negative; when domestic currency depreciates, the stock prices will also decrease. So, it may have different impacts at different times based on the positive or negative relations between the currency and the stock prices.

This study was made on broad-market indices in order to find out the relationship between Islamic stock indices and currency market indices which can help the international Islamic stock market investors to diversify their investment in four different countries. However, due to possible heterogeneity in countries within the individual broad-market indexes, our findings may not be generalized across all the component countries of an index. Therefore, my recommendation for future study is to consider currency rates returns of each country to stock index of the individual country returns that constitute an entire index (Dow Jones Islamic Index, Dow Jones Euro Islamic Index). This will make the investors more clear about the currency movement stabilities along with the Islamic stock market in that country.

10. References:

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