# Is Islamic stock index secured against interest rate risk? Evidence from Wavelet analysis

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# Is Islamic stock index secured against interest rate risk? Evidence from Wavelet analysis

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**Abstract**

This research is motivated by the desire to see the difference on interest rate risk exposure between Islamic and conventional equity across different investment horizons using wavelet analysis. Seven types of interest rates were tested with FTSE Bursa Malaysia Hijrah Shariah Index and FTSE Bursa Malaysia KLCI Index using data ranging from 1st March 2007 till 31st December 2014. The exposure to interest rate risk for both indices was highest at longer term investment horizon which is between 256 to 512 days; followed by investment horizon between 64-128 days. However, short term investment horizon which is between 2-4 days and 4-8 days has the lowest exposure to interest rate risk. High correlations between indexes across investment horizons had been demonstrated empirically. Hence, the hypothesis that an application of Islamic ethical screen would 'save' Islamic finance from interest rate risk is not accepted.

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# Is Islamic stock index secured against interest rate risk? Evidence from Wavelet analysis

## 1.0 Introduction

The modern Islamic finance industry was born since 1960s driven by intention to comply with *Shariah* requirements in conducting financial transactions. The last few years witnessed a tremendous growth in Islamic finance industry. Chong and Liu (2009) reported that Islamic finance was practiced by more than 50 countries worldwide with the value of Islamic assets across the globe was about US$250 billion in 2004 and rose to US$700 billion in the year of 2008 duly reported by the Economist. The value of Islamic asset under management further had grown tremendously in 2014 to US$ 3.5 trillion dollar (Shamsuddin, 2014). Hence, strong evidence of growing popularity in Islamic finance is justified.

Securities Commission Malaysia reported that the number of *shariah* compliant securities had increased from 652 in the year on 2013 to 673 as at 31st December 2014 with total market capitalisation worth RM 1,012.14 billion representing 61.3 percent to total market capitalisation in Malaysia.

Revisit the intention to have *shariah* compliant financial institutions, general guiding principle for Islamic transactions had been clearly mentioned in the *Quran* and the *hadith*. Despite that, Islamic scholars from the various of school of thought namely *mazhab* have concede that interest or usury which translated as 'excess' or 'increase' is totally banned outright in the Quran. Besides that, Muslims must avoid financial transaction which highly exposed to uncertainty which is known as *gharar*, outright gambling (*maysir*) and religious forbidden products as well as immoral activities. Instead, Islamic finance further urged to concentrates its investment in real sector or industries such as telecommunications, technology, health care, utilities, construction as well as real estate and engineering.

Therefore, following the guiding principles, theoretically, Islamic Finance is different from conventional finance because Islamic finance is asset based and asset driven whereas conventional system is interest based and driven by debt. With this, Islamic market shall not decouple from conventional counterparts.

In regards to Islamic investment activities, the companies listed in the stock indices had to undergo two tier of ethical and ratio screenings. Firstly, exclusion of non *shariah* compliant companies such as involving in *haram* product such as pork based, liquor and tobacco, gambling, entertainment, and conventional financial sector. Secondly, the screens on highly leveraged company based on financial ratio such as debt to equity ratio. In consequences, Islamic stock indices are expected to be more resilient to crisis as compared to conventional stock index.

However, it is important to note that restrictions may also deprive Islamic stock from enjoying the advantages of portfolio diversification. Hence, lead Islamic stock indices to concentrate in certain

sectors only. Therefore, the restriction imposed to Islamic investment activities might overruled the portfolio diversification theory by Markowitz; thus, leads Islamic product even riskier than conventional. Kamil *et al* (2012) investigate the effect of restrictions using compliant and non *shariah* compliant sector indices of Malaysia and United States adopting Multivariate GARCH-DCC. Authors concur with Markowitz portfolio diversification theory when they found that the exclusion on non *Shariah* compliant stocks disallow investor of *shariah* compliant to benefits from portfolio diversification.

Since Islamic equity in Malaysia need to comply with guidelines duly set up by Securities Commissions and Shariah Advisory Council (SAC) of Central Bank; hence, we are expecting that the return in investing in Islamic stock will be more resilient to the changes in interest rate as compared to the conventional. In other words, the return in investment in *shariah* compliant stock will less sensitive towards the changes in interest rates. Inconsistency in theoretical framework as well as empirical data lead the issue remains unresolved. Therefore, this research is a humbly attempt to investigate whether the return in Islamic stock index dampen to interest rate risk or have the same exposure as conventional market at different investment horizon with an application of wavelet CWT and MODWT.

Malaysia Islamic stock index which represents by FTSE Bursa Malaysia Hijrah Shariah Index have the same exposure to interest rate risk as per exposure to Malaysia conventional stock index which is represented by of FTSE Bursa Malaysia KLCI Index across different investment horizon and across varieties of interest rates. Highly correlations between indexes had been proved empirically; hence, the hypothesis of application of Islamic ethical screens would 'save' Islamic finance is rejected.

The paper is organised as follows: Section 2 provides the literature review. Section 3 details on the methodology used to study the lead-lag between FTSE Bursa Malaysia Hijrah Shariah Index and FTSE Bursa Malaysia KLCI Index against few degrees of interest rates as well as the correlations between these variables. Section 4 analyzes the results and summary while the implication of the result will be discussed in section 5. Section 6 discussed on the limitation and suggestions for future research.

## 2.0 Literature Review

Interest rate is an important macroeconomic variable which generally considered as the cost of capital. In other words, means the price paid for the use of money for a period of time. From borrower's perspective, interest rate is the cost of borrowing money; while, from lender's point of view, interest rate is the fee charged for lending money which also known as lending rate. Interest is forbidden in Islam due to it attempt to create money over money without any counter value to the contracting party especially when it was calculated on compounded basis (Alam and Uddin, 2009).

Interest rate further becomes concern to people due to several reasons. Firstly, the increase in interest rates will lead to increment in the interest expense especially to highly leveraged companies, thus; will reduce in the cash flows available for future dividends. Consequently, leads to negative impact to the share price of the company. In addition to that, the fluctuations in interest rates will affect the market value of financial assets and liabilities held by firms. Volatilities in interest rates also might affect the opportunity cost of equity investment. The higher the interest rate will make bonds more attractive given their risk-return characteristics, therefore; motivates investors to adjust their portfolios by buying bonds and selling stocks which lead to depressing the stock prices. Finally, the changes in interest rates will affect the equity prices via adjusting the expectations of future cash flow of the company (Moya *et al*., 2013). Hence, exposure to interest rate risk should be carefully managed as might lead to a disaster to the company; directly to the investors.

In relation to this, Chapra (2008) suggests that excessive lending, highly leverage in the system and the lack of tool and market discipline would leads to global crisis. Author further trust that the principles in Islamic finance can assist to pave the way for a better discipline into markets and prevent the occurrence of new crisis.

Despite that, Ahmad (2009) confident that global crisis indicates mismanagement of risk at institutional, organizational and product level. Therefore, attendant to principles in Islamic finance might assist in preventing the global crisis from happening.

Theoretical argument had been proof by Moya *et al*.(2013). Authors tested relationship between interest rate changes and stock returns in Spain adopting wavelet approach. The result shows that Spanish stock market has a remarkable degree of exposure to interest rate risk across industries. Unsurprisingly, they found that heavily indebted industries such as real estate, food and beverages as well as utilities and banking industries emerge as the most sensitive to interest rate. Hence, the argument made by Chapra (2008) and Ahmad (2009) shall be considered.

However, Shamsuddin (2014) highlighted that the literature in Islamic banking is vast, but not the literature in Islamic investment. Despite that, literature in Islamic investment mostly covers on the performance of Islamic equity indices and mutual funds only. Author did not found any study on interest rate sensitivity of Islamic stocks; however, considerable attention has been stress in the literature to study on interest rates exposures to Islamic stocks. Aged literature found pertaining to this issue; and normally research conducted to examine the relationship between interest rate changes and financial stock price. Hence, this relationship can be the proxy used as a proxy to measure interest rate exposure.

Many literatures concurred that interest rates has significant negative relationship with share price. However, surprising finding for Malaysia that interest rate has no relation with share price but changes of interest rate has negative relationship with changes of share price (Alam and Uddin, 2009).

Chong and Liu (2009) investigate whether Islamic banking in Malaysia are interest free or interest based tested using Engle Granger error correction. They found that Islamic deposits are not interest-free, furthermore, closely to conventional deposits. The changes in conventional deposit lead to the changes in Islamic investment rates, however, not the other way around. Despite that, Islamic investment rates are positively correlated to conventional rates in the long term. Based on these findings, the exposure of Islamic finance to interest rate risk perhaps would be the same as if in the conventional finance.

Dewandaru *et. al* (2015) comprehensively analyse the risk return characteristics in Islamic indices as compared to conventional at different investment horizons via applying wavelet analysis on Dow Jones indices of 11 countries which is world , Canada, India, Japan, Kuwait, Malaysia, Sri Lanka Turkey, U.S., U.K., China and GCC including 10 global sectors between the year of 2008 until 2012. Remarkably consistent with Chong and Liu (2009) findings, Dewandaru *et al* (2015) conclude that both Islamic and conventional indicates similar tendency in the betas at longer investment horizon. Since beta indicates the risk; hence, both conventional and Islamic indices have the same exposure to risk in the longer investment horizon. However, the differences in betas between Islamic and conventional indices at most of timescales are not statistically significant.

Krasicka and Nowak (2012) experiment the response of Malaysian Islamic and conventional security prices towards macroeconomic factors. Again, the Islamic and conventional bond and equity prices are driven by common factors and the gap between Islamic and conventional financial practices is weaken.

An attempt made by Ajmi et al. (2014) to examine the eventual link between the Islamic and global conventional stock markets, and between the Islamic stock market and several global economic and financial shocks using linear Granger causality and nonlinear Granger. Authors found that significant linear and nonlinear causality between Islamic and conventional stock markets. Therefore, Islamic market and their conventional counterparts are not decoupling. Furthermore, Islamic stock market and interest rates found to have a significant relationship with interest rates as well as interest-bearing securities. Authors highlighted that the result obtained was inconsistent with the *shariah* guiding principle.

Similar findings disclosed by Hammoudeh et. al (2014) which further suggest that the enforcement to *Shariah* compliance rules are not restrictive enough as to make the global Islamic equity market index contrast from conventional indices. Authors further emphasize that decoupling hypothesis of the Islamic equity universe from conventional financial system is not supported by their empirical evidence.

Interestingly, Shamsuddin (2014) found that the aggregate portfolio of Islamic stocks is immune to interest rate risk only at sectoral level, while some Islamic equity portfolios proof to expose to interest rate risk. However, Shamsuddin (2014) proof that the interest rate risk exposure is less

pronounced among Islamic sector portfolios than that conventional in their mainstream counterparts. Author is testing Dow Jones Islamic market index from U.S., U.K., Canada, Japan, Switzerland, Australia, France, Taiwan, Germany, *muslim* countries and other using ARCH, GARCH and TGARCH. The result suggests that the changes in long term interest rate and volatility of the long term interest rate will not influence the return behaviour of the DJ Islamic Market Index. Hence, concluded that pre-screening methodology is effective to ensure that aggregate Islamic equity portfolio immune to interest rate movements.

## 3.0 Methodology

### 3.1 Wavelet

Financial markets are extremely complex in the system. It consists of thousands of heterogeneous traders and investor; making decision based on different investment horizon. For example, big institutional investors like pension fund have long-term investment horizon while speculator just entered the market for just few days and even for just few minutes! The main advantages of wavelet is its ability to decompose any signal into time scale components, flexibility to handle non-stationary data and their capacity to provide an alternative representation of the variability and association structure between variables according to varies investment horizons. The sensitivity of stock returns to movements in long-term interest rate is substantially greater than the sensitivity to changes in short terms rates.

Hence, the application of wavelet to test the exposure of Islamic equity to vary types of interest rates across different investment horizon will assist investors, portfolio managers, corporate managers and policy makers to obtain critical information for risk management, asset allocation as well as for portfolio management or policy decision making.

### 3.2 Continuous Wavelet Transformation (CWT)

Original time series being mapped in CWT and will representing a function of a variable time-separate into function of two different variable such as time and frequency. The advantage of CWT as compared to DWT and MODWT is that the number of time horizons will be generated by itself according to the length of data. CWT provides two dimensional figure of the correlations; hence, enables researcher to identify and interpret the patterns. In this research, least asymmetric wavelet filter of length L=8 denoted by LA (8) based on eight non-zero coefficients were used.

### 3.3 Maximal Overlap Discrete Wavelet Transform (MODWT)

The MODWT generally known as stationary wavelet transform. It is highly redundant, non-orthogonal transform; hence, allow alignment of decomposed wavelet and scaling coefficient at each level with the original time series. As a result, comparison between the series and it decomposition can be obtained.

## 4.0 Results and Discussions

### 4.1 Data analysis

In this research, the return on FTSE Bursa Malaysia Hijrah Shariah Index is used as a proxy for the Malaysian Islamic stock index. Whereby, the return in FTSE Bursa Malaysia KLCI Index is used as a proxy for the Malaysian conventional stock index. Varieties of interest rates such as Overnight Policy Rate (OPR), KLIBOR one month, KLIBOR two month, KLIBOR three month, KLIBOR six month, KLIBOR nine month and KLIBOR one year being used to be a proxy for interest rate risk against Malaysian Islamic stock index. While Malaysian conventional stock index used as control variable for a comparison purpose, hence; the result would allow identifying whether Malaysian Islamic stock index or Malaysian conventional stock index exposed more to interest rate risk. FTSE Bursa Malaysia Hijrah Shariah Index and FTSE Bursa Malaysia KLCI were chosen in this research as both indices shared a similarity in term of consists of thirty (30) strongest companies in each indexes. Hence, due to the same underlying principle; research was expected to be more consistent. Table 1 below lists the variables being considered in this research.

Table 1 : Selected Variables for Research

| Symbol | Definition |
|---|---|
| **HJS** | FTSE Bursa Malaysia Hijrah Shariah index |
| **KCI** | FTSE Bursa Malaysia KLCI index |
| **OPR** | Overnight policy rate |
| **KOM** | KLIBOR one month |
| **KTM** | KLIBOR two month |
| **KTHM** | KLIBOR three month |
| **KSM** | KLIBOR six month |
| **KNM** | KLIBOR nine month |
| **KOY** | KLIBOR one year |

Daily time series closing price data for both indices as well as interest rates were collected starting from 1st March 2007 till 31st December 2014. All data are taken from Thomson-Reuters DataStream database except for Overnight Policy Rate (OPR) which is extracted from Bank Negara Malaysia website. Table 2 presents some descriptive statistics of the data.

Table 2 : Descriptive Statistics of The Data

| | Mean | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Probability | Observations |
|---|---|---|---|---|---|---|---|
| **HJS** | 0.000303 | 0.008553 | -1.257548 | 20.96218 | 28003.21 | 0.000 | 2043 |
| **KCI** | 0.000196 | 0.007859 | -1.268007 | 19.46215 | 23616.54 | 0.000 | 2043 |
| **OPR** | -3.86E-05 | 0.014242 | -2.227747 | 127.9985 | 1331735 | 0.000 | 2043 |
| **KOM** | -2.37E-05 | 0.007802 | -22.18845 | 677.3544 | 38878557 | 0.000 | 2043 |
| **KTM** | 1.32E-05 | 0.007455 | -24.47687 | 737.8632 | 46173532 | 0.000 | 2043 |
| **KTHM** | 2.47E-05 | 0.007038 | -25.07165 | 757.7412 | 48704147 | 0.000 | 2043 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **KSM** | 2.44E-05 | 0.007003 | -24.79609 | 743.7425 | 46917395 | 0.000 | 2043 |
| **KNM** | 2.42E-05 | 0.007109 | -24.65098 | 736.6739 | 46027775 | 0.000 | 2043 |
| **KOY** | 2.15E-05 | 0.006899 | -24.22874 | 722.6002 | 44279691 | 0.000 | 2043 |

Volatility represents by standard deviation. Based on the result, Overnight Policy Rate (OPR) shows the highest volatility followed by FTSE Bursa Malaysia Hijrah Shariah Index and FTSE Bursa Malaysia KLCI index; while, the least volatile is KLIBOR one year. The standard deviation indicates that absolute time independent volatility of the return.

Negative values in skewness for all variables indicate that variables are asymmetric property in the distributions; hence, leading to lower variability and risk.

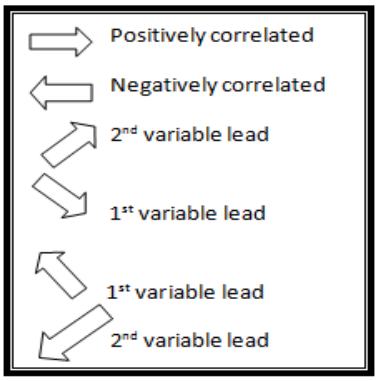
Kurtosis represent the fatness of the distributions which finally describe how concentrated the data are around the mean distribution. From the table 2, kurtosis values are all more than 3; therefore indicates that all variables are not normally distributed which leads to higher risk.

Jarque – Bera test results shows that all variables are significant; meaning that the non-normality, variability and higher risk of the return for the variables are further strengthened.

### 4.2 Exposure of FTSE Bursa Malaysia Hijrah Shariah Index to wide range of interest rates at different investors' investment horizons –CWT

Figure 2 until Figure 7 shows the exposure of FTSE Bursa Malaysia Hijrah Shariah to different types of interest rate at different investment horizon from scale 1 (one day) up to scale of 8 (approximately two market years of 512 days). Vertical axis referred to investment horizon. Scale 1 refers to investment horizon between 2-4 days, scale 2 to between 4-8 days, scale 3 refers to investment horizon between 8-16 days, scale 4 refers to investment horizon between 16-32 days, scale 5 between 32-64 days, scale 6 between 64-128 days, scale 7 between 128-256 days and scale 8 between 256 to 512 days. Time is shown on the horizontal axis in term of the date of trading tenure. The figure follows a colour code as illustrated on the right ranges from blue to red represents the correlation between FTSE Bursa Malaysia Hijrah Shariah and selected interest rate. If you eyeball the figure, the direction of arrow would provide the signal of lead-lag relationship between FTSE Bursa Malaysia Hijrah Shariah and selected interest rate.

Figure 1: Lead-Lag Relationship Indicates By Arrow in CWT




Looking at Figure 2 until Figure 7 at a glance, three similarities in the patterns can be observed. First of all, mostly the figures coloured in blue during investment horizon of 2-4 days and 4-8 days starting from the first observation date which is 1st March 2007 till the end at 31st December 2014. Therefore, indicates that FTSE Bursa Malaysia Hijrah Shariah has a lower correlation with varieties of interest rates during this investment horizon. In other words, FTSE Bursa Malaysia Hijrah Shariah (also represent as Islamic stocks) did not follow interest rates; hence, has a lower exposure against interest rates risk at this investment horizon.

Secondly, yellowish to oranges coloured in the figure at investment horizon of 64-128 days, in between January 2009 up to May 2011 indicates that medium correlation between Islamic stock and interest rates at that investment horizon and date. Rigorous observation leads to recognization in the changes in correlation at this moment (effective on 31st December 2010 until mid 2011) across different types of interest rates. The correlation between Islamic stock index becoming stronger across KLIBOR one month, KLIBOR two month, KLIBOR three month up to KLIBOR six month and became weaker with KLIBOR nine month until KLIBOR one year. Finally, the correlation became weakest with Overnight Policy Rate (OPR). Arrows in the figure assist to indicate whether Islamic stock or interest rate leading the movement of this correlation. With reference to figure 1, the arrow should be translated as the variables are moving together as well as second variable which is interest rate leads the movement during this investment horizon and tenure. In conclusion, the interest rates lead the correlation while Islamic stock index would follow the movement.

Finally, common patterns obviously shown at investment horizon 256-512 days across the difference in interest rates types. The correlations becoming stronger effective from KLIBOR one month up to KLIBOR one year, while the weakest correlation displayed with Overnight Policy Rates (OPR). Looking at the arrow's direction at each figure, again, concluded that interest rates lead the correlations.

In conclusion, FTSE Bursa Malaysia Hijrah Shariah or Islamic stock index does not exposed to interest rate risk at short investment horizon which is between 2-4 days and 4-8 days. However, the Islamic stock is highly exposed to interest rate risk at long term investment horizon especially

at investment horizon between 64-126 days and 256 to 512 days as interest rates lead the correlations.

**Figure 2: Continuous Wavelet Transform – HJS and KOM**

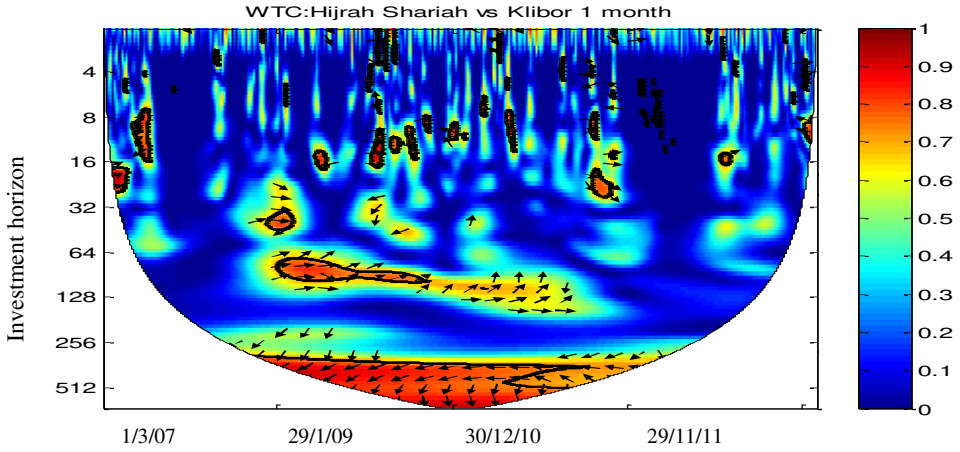



**Figure 3: Continuous Wavelet Transform – HJS and KTM**

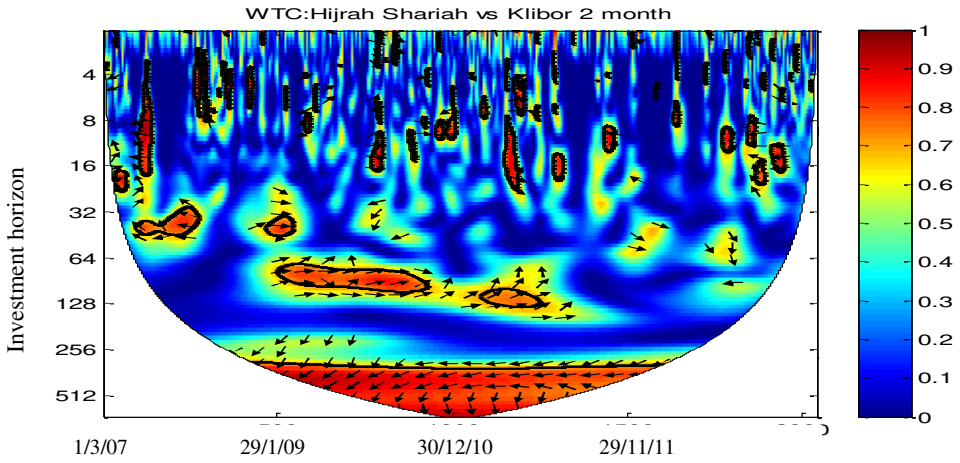



**Figure 4: Continuous Wavelet Transform – HJS and KTHM**

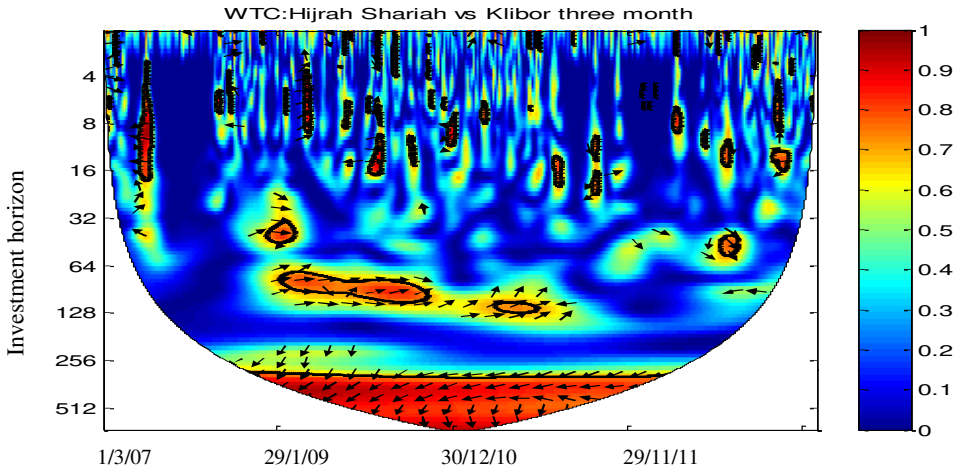



**Figure 5: Continuous Wavelet Transform – HJS and KSM**

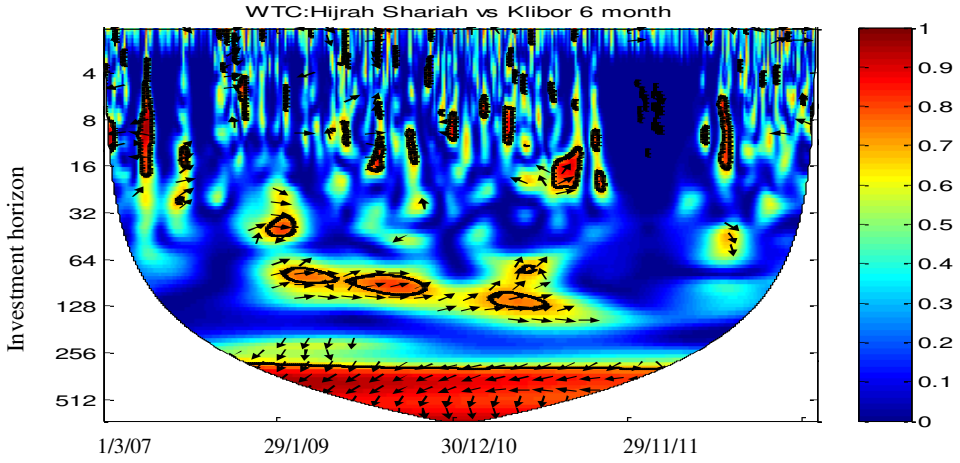



**Figure 6: Continuous Wavelet Transform – HJS and KNM**

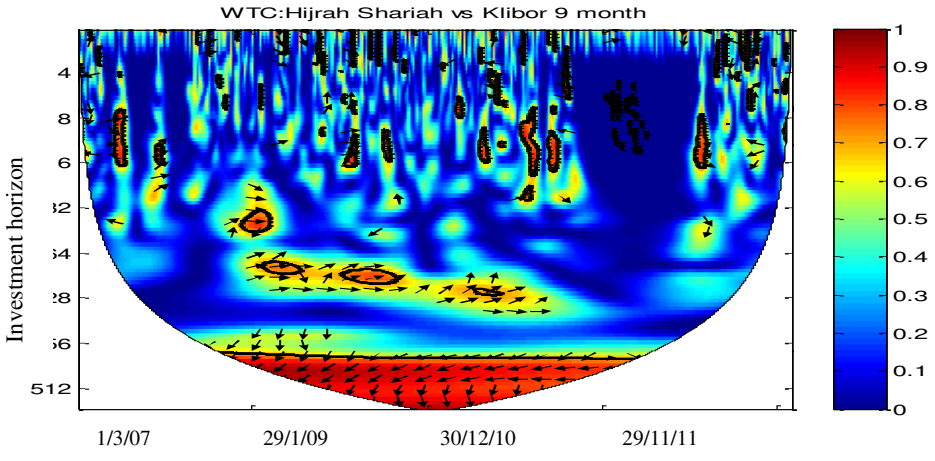



**Figure 7: Continuous Wavelet Transform – HJS and KOY**

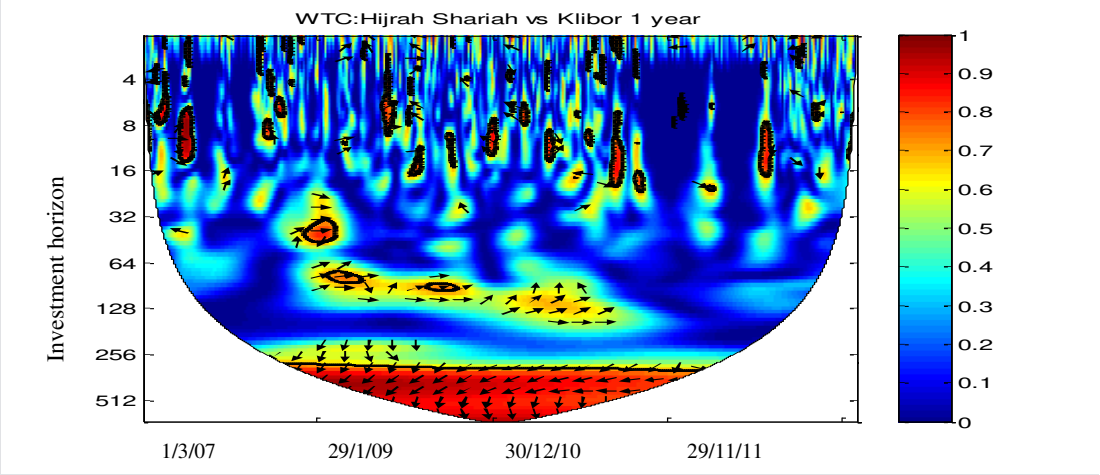
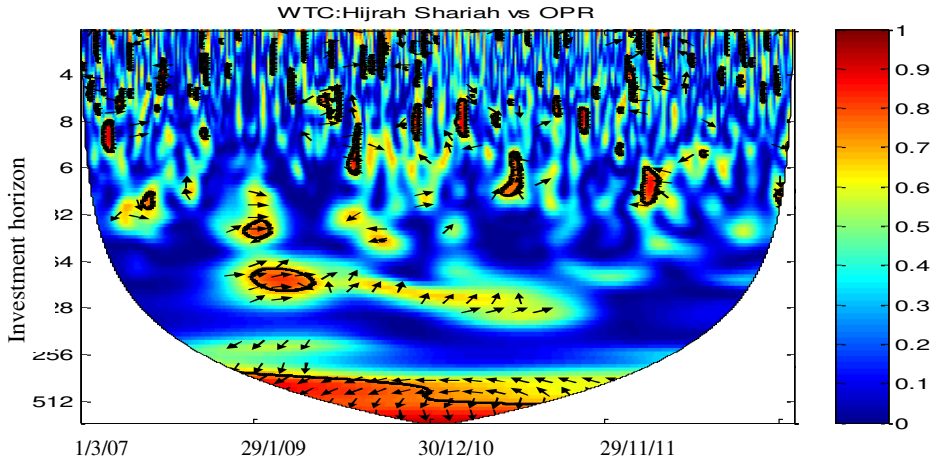



**Figure 8: Continuous Wavelet Transform – HJS and OPR**




### 4.3 Exposure of FTSE Bursa Malaysia KLCI Index to wide range of interest rates at different investor's investment horizon – CWT

Three identical patterns as discussed in the correlations between FTSE Bursa Malaysia Hijrah Shariah Index (being proxy for Islamic stock index) and interest rates displayed the same patterns in the correlations between FTSE Bursa Malaysia KLCI Index (representing conventional stock index) across the varieties of interest rates shown in Figure 9 till Figure 15.

This is including the lowest correlations between FTSE Bursa Malaysia KLCI Index with respect to interest rates at investment horizon between 2-4 days and investment horizon between 8-16 days. Thus, the return in investment in FTSE Bursa Malaysia KLCI Index will have slight exposure to the interest rate risk at this investment horizon.

However, the exposure to the interest rate risks getting stronger in the investment horizon 64-128 days across KLIBOR one month till KLIBOR one year as translated by the correlations. Nevertheless, the correlation between conventional stock index displayed the weakest correlation with Overnight Policy Rate (OPR). In regards to lead-lag relationship between the conventional stock index and interest rates, the arrows demonstrate that interest rates leading the movement of conventional stock index at this moment.

In regards to investment horizon between 256-512 days, getting stronger in the investment horizon 64-128 days across KLIBOR one month till KLIBOR one year, but very mild correlation with Overnight Policy Rate (OPR). Again, the arrows indicate those interest rates leading the flow of conventional stock index at this moment; directly affecting the return on investments.

From the similarities found in the exposure to varieties of interest rates at different investment horizon, FTSE Bursa Malaysia Hijrah Shariah Index and FTSE Bursa Malaysia KLCI Index is suspect to have highly correlation, leads to another puzzle.

**Figure 9: Continuous Wavelet Transform – KLCI and KOM**

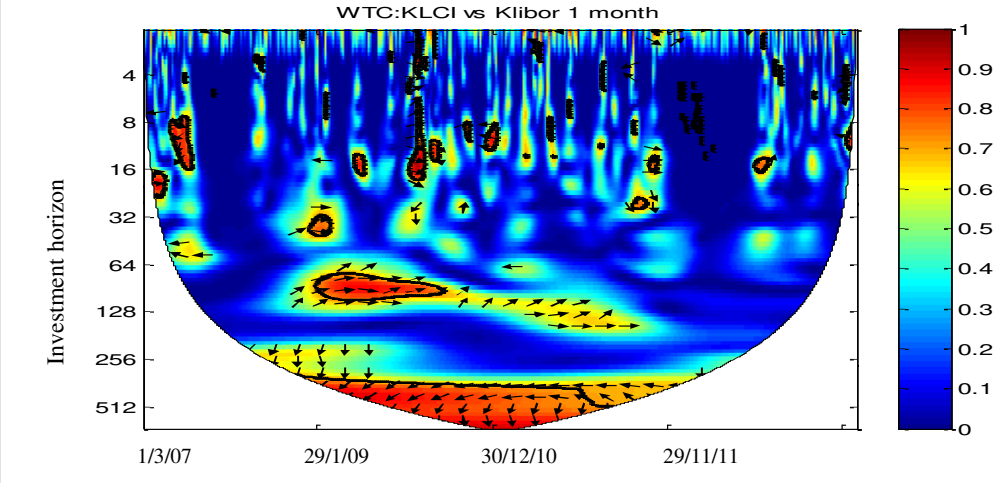



**Figure 10: Continuous Wavelet Transform – KLCI and KTM**

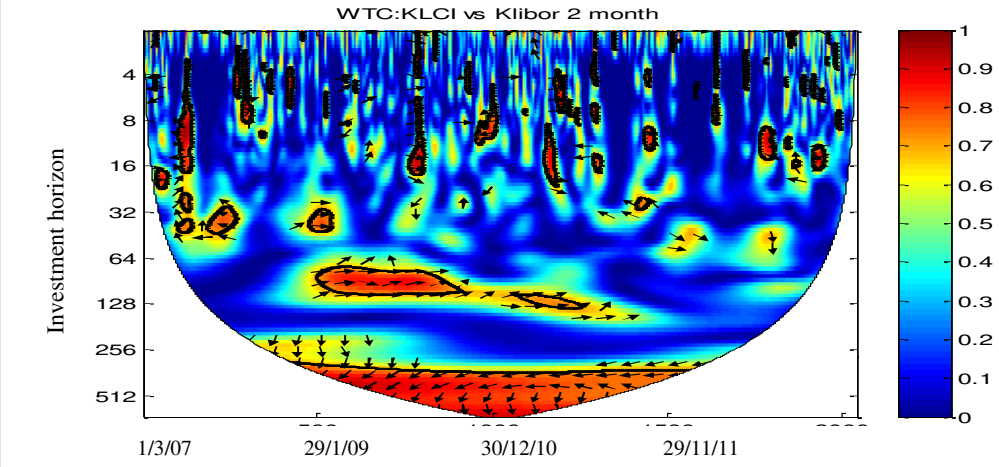


**Figure 11: Continuous Wavelet Transform – KLCI and KTM**

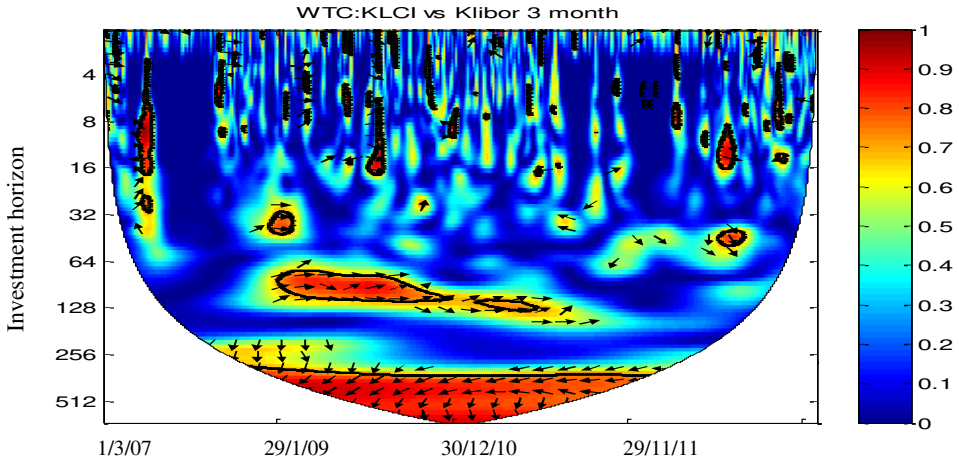



**Figure 12: Continuous Wavelet Transform – KLCI and KSM**

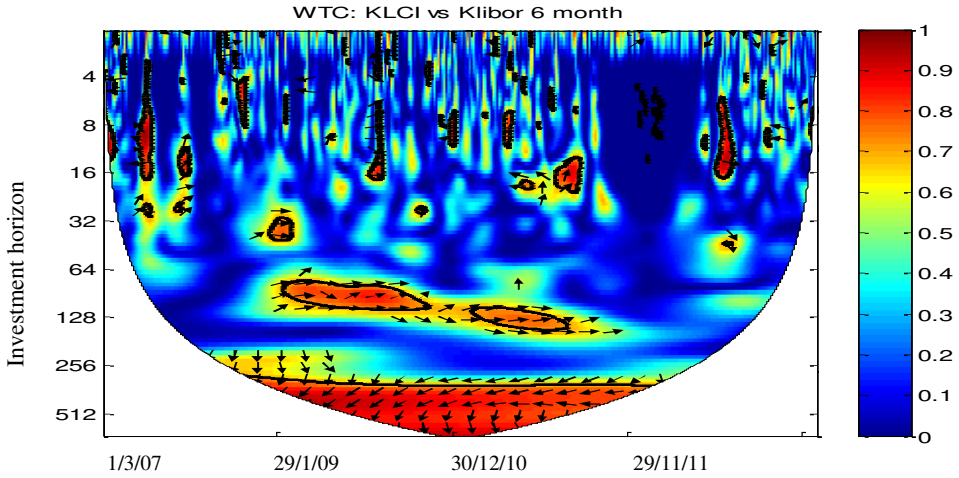



**Figure 13: Continuous Wavelet Transform – KLCI and KNM**

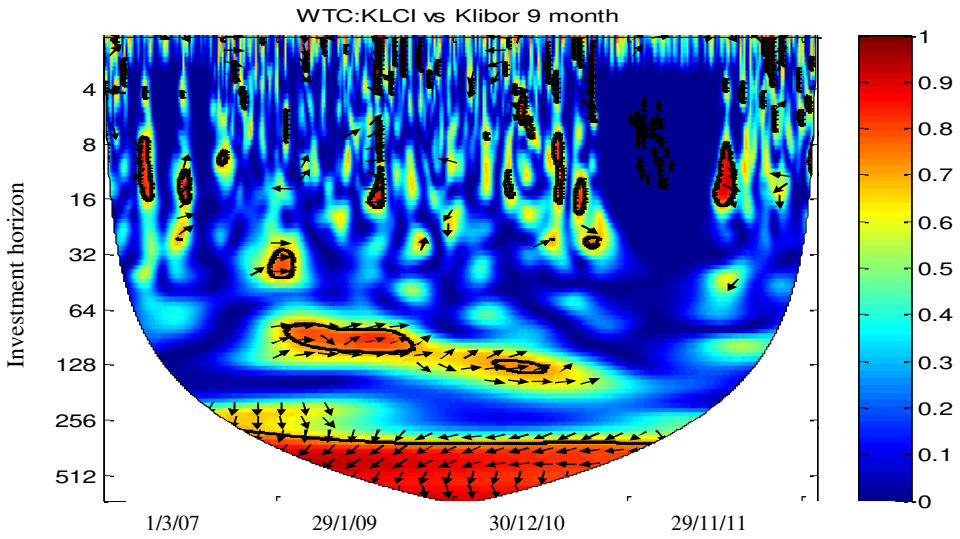



**Figure 14: Continuous Wavelet Transform – KLCI and KOY**

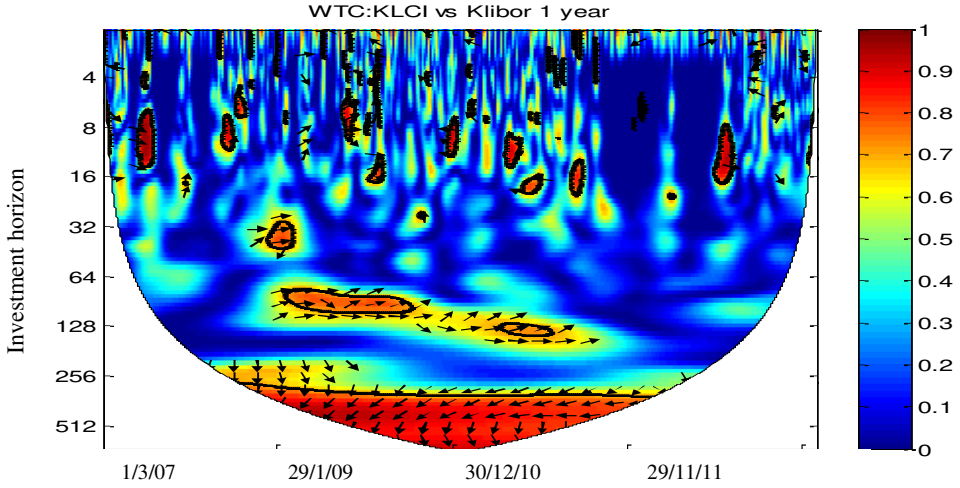
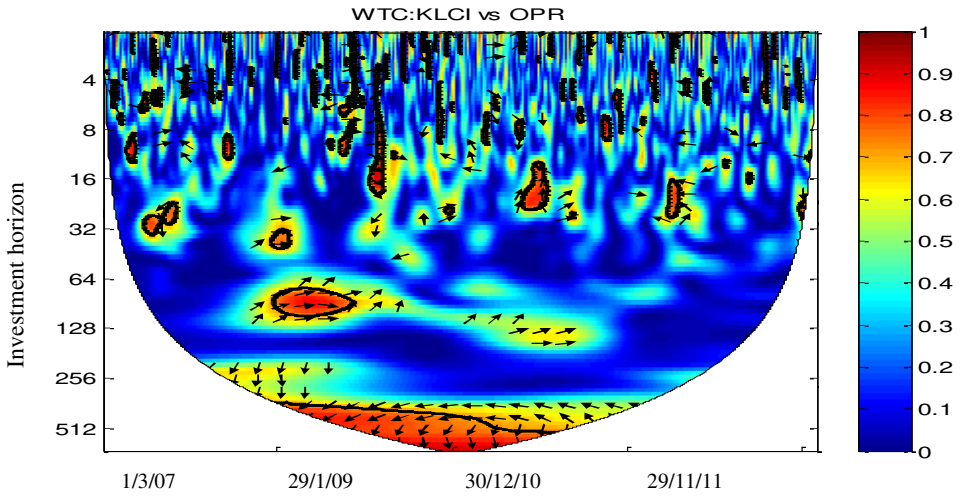



**Figure 15: Continuous Wavelet Transform – KLCI and OPR**




### 4.4 Is FTSE Bursa Malaysia Hijrah Shariah Index exposed more to interest rates risk as compared to FTSE Bursa Malaysia KLCI Index at different investment horizons?

The similarities in the correlation between FTSE Bursa Malaysia Hijrah Shariah Index (which represents Islamic stock index) and FTSE Bursa Malaysia KLCI Index (which represents conventional stock index) to varieties of interest rates even at different investment horizon leads to unresolved puzzle. Secondly, question rose whether Islamic stock index leads the correlation or lagging behind conventional stock index?

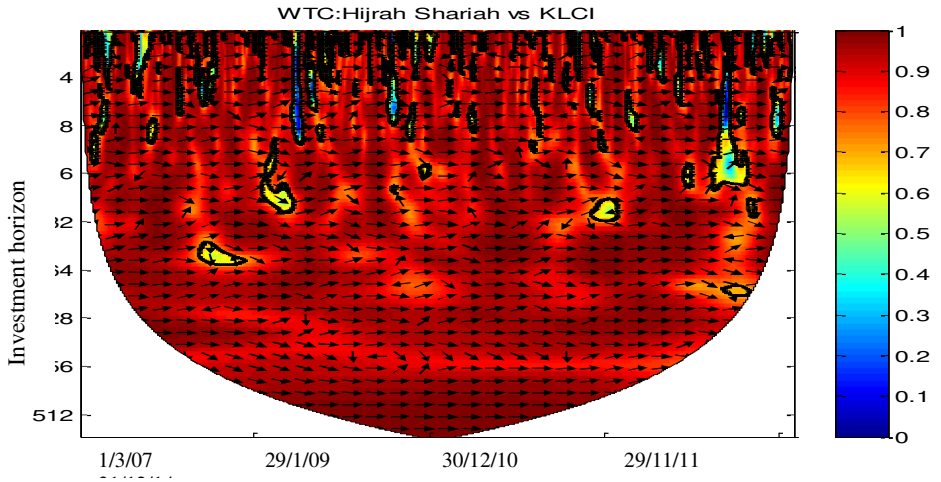
CWT used to test the correlation between FTSE Bursa Malaysia Hijrah Shariah Index and FTSE Bursa Malaysia KLCI Index. Result in Figure 16 answered both queries.

First, highly correlations between FTSE Bursa Malaysia Hijrah Shariah Index and FTSE Bursa Malaysia KLCI Index at all investment horizons explained the similarities in the patterns and exposure between the indexes against varieties of interest rates.

Secondly, most of the arrows pointed to the right which indicates that the indexes are moving together. At time investment horizon 256 days, shows that Islamic stock index leads the movement of conventional stock index.

Based on these results, we might conclude that FTSE Bursa Malaysia Hijrah Shariah Index or Malaysian Islamic stock index have the same exposure to the interest rate risk as per Malaysian conventional stock index which represented by FTSE Bursa Malaysia KLCI Index even the Islamic stocks passed the requirement to be established as *Shariah* compliant stock; such as not interest based and lower leverage or debt to equity ratio which expected to be a shield against highly interest rates risk exposure.

**Figure 16: Continuous Wavelet Transform – HJS and KLCI**




### 4.5 Robustness of research – MODWT Transformation

To further give confidence to results from 4.2 until 4.4, Maximum Overlap Discrete Wavelet Transform (MODWT) applied to the data. Using the newly generated MODWT return series, the correlations between FTSE Bursa Malaysia Hijrah Shariah Index vis-à-vis interest rates across the investment horizon displayed in Table 3 below. Secondly, the correlations of FTSE Bursa Malaysia KLCI vis-à-vis interest rates shown in Table 4; finally, the correlations of FTSE Bursa Malaysia Hijrah Shariah Index vis-à-vis FTSE Bursa Malaysia KLCI Index displayed in Table 5. The results are remarkably consistent with the result obtained in the CWT analysis.

Table 3 : Correlations of FTSE Bursa Malaysia Hijrah Shariah Index vis-à-vis interest rates – MODWT Transformations

| Scaling (Days) | KOM | KTM | KTHM | KSM | KNM | KOY | OPR |
|---|---|---|---|---|---|---|---|
| 2-4 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | -0.04 | 0.01 |
| 4-8 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | -0.05 | -0.03 |
| 8-16 | 0.00 | -0.01 | -0.01 | 0.00 | -0.01 | -0.01 | 0.02 |
| 16-32 | 0.07 | 0.08 | 0.08 | 0.08 | 0.07 | 0.09 | 0.07 |
| 32-64 | 0.20 | 0.23 | 0.23 | 0.27 | 0.27 | 0.27 | 0.13 |
| 64-128 | 0.33 | 0.38 | 0.38 | 0.34 | 0.31 | 0.28 | 0.28 |
| 128-256 | -0.04 | -0.04 | -0.04 | 0.00 | 0.01 | 0.02 | -0.07 |
| 256-512 | -0.85 | -0.85 | -0.85 | -0.86 | -0.88 | -0.87 | -0.80 |

Table 4 : Correlations of FTSE Bursa Malaysia KLCI Index vis-à-vis interest rates – MODWT Transformations

| Scaling | KOM | KTM | KTHM | KSM | KNM | KOY | OPR |
|---|---|---|---|---|---|---|---|

| (Days) | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2-4 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | -0.04 | 0.02 |
| 4-8 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | -0.05 | -0.01 |
| 8-16 | -0.02 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | 0.02 |
| 16-32 | 0.08 | 0.09 | 0.08 | 0.09 | 0.08 | 0.10 | 0.08 |
| 32-64 | 0.25 | 0.28 | 0.30 | 0.30 | 0.30 | 0.29 | 0.17 |
| 64-128 | 0.36 | 0.41 | 0.40 | 0.37 | 0.34 | 0.31 | 0.32 |
| 128-256 | 0.12 | 0.12 | 0.14 | 0.17 | 0.19 | 0.20 | 0.10 |
| 256-512 | -0.81 | -0.83 | -0.84 | -0.86 | -0.88 | -0.88 | -0.73 |

Table 5 : Correlations of FTSE Bursa Malaysia Hijrah Shariah Index vis-à-vis FTSE Bursa Malaysia KLCI Index – MODWT Transformations

| Scaling (Days) | HJS-KCI |
|---|---|
| 2-4 | 0.92 |
| 4-8 | 0.93 |
| 8-16 | 0.93 |
| 16-32 | 0.94 |
| 32-64 | 0.95 |
| 64-128 | 0.95 |
| 128-256 | 0.95 |
| 256-512 | 0.99 |

**4.6 Why FTSE Bursa Malaysia Hijrah Shariah Index highly correlated with FTSE Bursa Malaysia KLCI Index? Which means, why FTSE Bursa Malaysia Hijrah Shariah Index (represent Malaysia Islamic stock index) has the same exposure to interest rate risk even after Shariah screening process? Which restricted on the debt to equity ratio and highly leverage stocks?**

The results obtained in 4.2 until 4.4 and remarkably consistent with MODWT robustness test in 4.5 rose questions. How could this happen to Islamic stock index? Islamic stock index expected to have a lower exposure to interest rate risks as compared to conventional stock index due to diligent screening methodology. Similar result obtained by Hassan et. al (2005) which conclude that the application of Islamic ethical screens do not have an adverse impact on investment performance.

An attempt to eye ball on the constituents listed in both indexes to seek for answer to this puzzle. However, due to limitation of data, the comparison at supersector breakdown listed in the indexes,

taking into consideration on the highly exposure sector in the indexes as well as the weightage being referred to FTSE Factsheet as at 31st March 2015. We found that FTSE Bursa Malaysia Hijrah Shariah Index own 0.7 percent investment in financial institutions whereas, FTSE Bursa Malaysia KLCI Index own 31.67 percent in financial services. Hence, the conventional suppose more exposed toward the changes in interest rate risk. However, revisit the tremendous progress in financial engineering; conventional markets had been facilitated and allow to fully utilizing several kinds of hedging tools against risk. Hence, would assist conventional market from highly affected by any unwanted shock.

Despite that, it is noticed that FTSE Bursa Malaysia Hijrah Shariah Index can be the subset of FTSE Bursa Malaysia KLCI Index. In other words, constituents in FTSE Bursa Malaysia Hijrah Shariah Index can be the constituents in FTSE Bursa Malaysia KLCI Index as well. Finally, leads to highly correlations between these indexes. Therefore, the exclusives of shariah compliant stock will not be adore by investors.

## 5.0 Summary of the Results and Policy implications

Malaysia Islamic stock index which represents by FTSE Bursa Malaysia Hijrah Shariah Index have the same exposure to interest rate risk as per exposed to Malaysia conventional stock index which is represented by of FTSE Bursa Malaysia KLCI Index across different investment horizon as well as across varieties of interest rates. Highly correlations between indexes had been proved empirically; hence, the hypothesis of application of Islamic ethical screens would 'save' Islamic finance from interest rate risk is not accepted.

In this research, the exposure to interest rate risk was highest at long term investment horizon which is between 256 to 512 days; followed by investment horizon between 64-128 days. However, short term investment horizon which is between 2-4 days and 4-8 days has the lowest exposure to interest rate risk.

Investor with long term investment horizon such as pension fund, mutual fund and Tabung Haji is advisable to engage into derivatives in order to minimize the impact of interest rate risk to their investment returns.

Regulators shall strengthen Islamic financial system via facilitating the best armor in order to combat with de trop possessions. Despite that, regulators shall recognize the benefit of large diversifications to the investor; without violating *shariah* rules. Therefore, the advantages of Islamic Finance as compared to conventional finance will be recognized and appreciate across the globe.

## 6.0 Limitations / Suggestions for Future Research

The analysis in this paper mainly empirical in nature and more economic explanations in regards to highly correlations between Islamic and conventional stock index is needed.

The breakdown in the constituents in the indexes as well as the weightage shall be observed as the constituent will be changing on semi annually basis. With this information, more explanations might be provided to investors regards to the exposure of the indexes to the interest rate risk. Finally, lead to more appropriate decision made by investors whom have a different investment horizon.

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