INTEREST RATE CHANGES AND ISLAMIC STOCK RETURN WITH WAVELETS: THE CASE OF INDONESIA

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Abstract

In a global economy, shocks affect many financial sectors including stock market through the discount factor of the cash flow model. As in the conventional stock market where global shocks play a significant role in influencing stock prices, it also occurs in the Islamic stocks. This paper investigates the linkage between interest rate and stock returns for Indonesia with the sample period from January 2005 to December 2012 in the time-frequency domain by using a number of cross-wavelet tools. The results reveal that the similar response of the Islamic and conventional equity finance to the global shock. In turn, the result depicts that the Islamic equity market is also sensitive to the monetary tools used in the conventional system. The results have useful implications for policy makers in the face of a global financial crisis to prevent the steep fall of stock market price by increasing or decreasing the interest rate. In other words, since interest rate changes have an impact in the stock market, harmonisation of monetary policies mainly in developed countries can contribute to a decrease in the contagion potential on the stock markets.

Keywords: Islamic Stock, wavelet

1. Introduction

During the global financial crises (GFC), the slope in the stock market caused a heavy loss of trillions of dollars in market capitalisation with a disastrous impact on the wealth of 'buy and hold' investors. For example, in October 2008, both the S&P 500 and the Dow Jones Industrial Average faced a fall of 11.58% and 11.08%, respectively. GFC also hit the economy of Indonesia including the stock market. Throughout much of 2008, the monetary authorities seemed concerned with containing inflationary pressures stemming from the dual food and energy shocks. The official interest rate was increased from 8.0 percent in January 2008 to 9.5 percent in November 2008. Since then, the mood of policy-makers has shifted. In its report on monetary policy in the final quarter of 2008, Bank Indonesia noted that in Quarter 4, 2008, Indonesia's economic performance began to show signs of impact from the global economic downturn. The stock market plummeted reversing all the gains that took place between 2005 and 2008. The exchange rate also depreciated significantly. The official projections were that growth would be around 4 to 5 percent in 2009, but the private sector forecasts suggested a worst-case scenario of 2.5 percent growth in 2009.

The Indonesian government has responded to the rapidly evolving global economic crisis with a combination of financial, monetary and fiscal policies. Monetary policy has been eased. The interest rate (as of March 4, 2009) stands at 7.75 percent, the lowest level since July 2005. The Governor of the Bank of Indonesia, during a speech given at the 2009 Bankers' Dinner, noted that the official interest rate is likely to be in the 5 to 7 percent range. A fiscal stimulus package has been enacted (effective from March 1, 2009) amounting to 1.4 percent of GDP. Given that monetary policy operates with a long and variable lag, it is difficult to assess the extent which the current easing of monetary

policy can offset the effects of a phase of tightening that was sustained between January and November 2008. The fiscal stimulus package deserves further scrutiny. If the worst-case scenario of growth is falling well below the projected 4 percent rate materialises, then the magnitude of the fiscal policy response might not be enough. One can also express reservations about the composition of the fiscal policy package. In sum, throughout much of 2008, the Indonesian government did not seem particularly perturbed by the rapidly unfolding global economic crisis and its implications for the national economy. There was a growing realisation in the final quarter of 2008 that Indonesia would not be immune to the global economic downturn.

Figure 1: Interest Rate and Islamic Stock Market

(Japan, Kuwait, Indonesia)
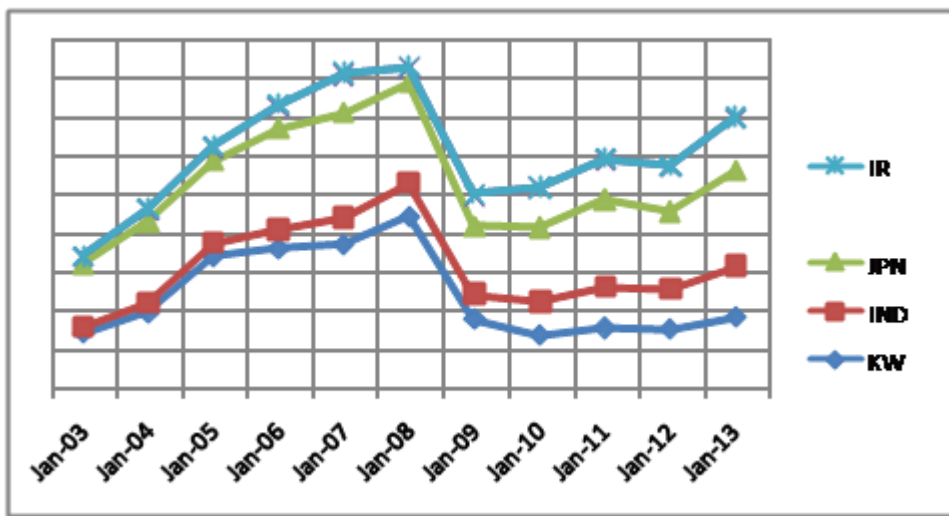
Source: Datastream

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Figure 1 describes the movements of interest rate and Shariah stock indexes in three major countries. In other words, there is a manifestation of the power of interest rates' influence on the Shariah financial system. The similarity of Islamic stock movements in parallel with interest rate in Figure 1 is probably caused by the same variables which are significant in affecting all of the Islamic indexes. The interest rate is one of the primary instruments for measuring money and capital market governance. In financial theory, interest rate as a measurement of the time value of money is one of the main determinants of stock returns. Stock prices reflect the expected future cash-flows of the firms affected by the future aggregate demand, so the expectations of an economic recession have a significant negative impact on stock prices. Huang (2016) examined the effect of the U.S. stock markets on fluctuations in the real interest rates based on the weekly data starting from January 3, 2003 to March 27, 2015. The findings reported higher correlation coefficients, magnified impulse responses and variance decompositions when real interest rates turned negative in early 2009. These findings can be an alternative stock market index in the recent period. The interest rates and price pressures can be combined in goods markets to provide the majority of the driving forces that are supported by commodities and foreign exchange from external markets

Although a plenitude of studies has identified the role of monetary policy shock in the stock market, only a few of them particularly focus on Islamic stocks. In addition, this study also analyses the conventional stock market for comparison purposes in order to see whether there are different responses of Islamic and conventional stock to the shock. Finally, the study focuses on the different stages (pre-crisis, crisis and post-crisis), to figure out the shifts in the relationship between interest rate and stock markets. The focus of our study is on whether the correlation between those variables changes and on the direct impact of interest rate shocks on stock market returns. By using the GFC event, the present research intends to identify the role of interest rate in the three distinctive phases of crisis (pre, during and post) transmission. This objective addresses the severity of the GFC on different economies and whether this issue is directly connected with the movement of global market indexes and interest rate, since the world economies have different levels of financial systems development, and thus they are not affected in the same way. To our knowledge, limited studies have examined the time and frequency varying response of Islamic and conventional stock market to the global financial shock mainly in Indonesia. There have been limited studies relying on wavelets to address the inconsistency in the correlations among stock markets where the shocks intrude, especially in the Islamic stock market. Moreover, most of the studies that examined the relationship between interest rates and stock prices were primarily in the time domain. A wide range of time series methods were adopted, including VAR techniques (Campbell and Ammer, 1993; Laopodis, 2010), cointegration analysis (Chan et al., 1997; Das, 2005; Hatemi-J and Roca, 2008), Granger causality tests (Panda, 2008; Shah et al., 2012), non-linear models (Ballester et al., 2011; Bartram, 2002), and GARCH type models (Faff et al., 2005; Kasman et al., 2011). Nevertheless, several studies conducted in the past have examined the interest rate equity market nexus through the use of wavelet techniques (Cifter and Ozun, 2008; Hamrita and Trifi, 2011; Andrieş et al., 2013). These studies laid emphasis on aggregate stock markets of numerous countries and demonstrated that the relationship between interest rates and share prices is reliant on the time horizon, whereby the importance intensifies at longer horizons. These studies also employed various discrete wavelet transform, which is known as the maximal overlap discrete wavelet transform (MODWT). This transform has attractive features and it is a prominently used wavelet in economic applications. It can deal with any sample size and represent translation or shift invariant as a shift in the signal.

The study differs from previous studies as it contributes to the literature on financial market and interest rate. It endeavours to provide new evidence for the effect of financial shock on the disruption of correlations among stock markets by adopting a wavelet method to address heteroscedasticity biases. Unlike the conventional regression and standard time series techniques, the use of wavelet technique methodology allows us to obtain correlation estimates at different frequencies and consequently to analyse time series on a variety of time levels or scales. Moreover, contrary to tests performed at different arbitrary time levels (such as daily, weekly or monthly), wavelet decomposition allows us to avoid information loss (what is not captured at one level will be captured at another) and overlapping of the information used in one level with respect to the other (Barragan, 2015). The present study proposes the concept of Islamic stock markets and interest rates to enrich the Islamic finance literature, particularly in developed and developing countries. Therefore, it is expected to fill in the literature gap to increase our understanding of the dynamics of correlations for financial research and applications in the financial industry mainly in the Islamic stock markets.

2. Literature Review

The interest rate is an influential determinant of monetary policies. However, interest rate volatility is an obstacle to financial stability. Stock market considerations represent the crucial input for the central bank policy. Therefore, this study posits that price disruptions in one market are likely to affect other markets. In developing countries, the interest rate is expected to increase when the stock market value falls and, on the other hand, the interest rate to decrease when the stock market value remains unchanged or even soars, especially for developing countries. Recently, the financialization of commodity markets has strengthened the links between interest rate and stock markets, including Shariah stock market. Many argue that the endurance of Shariah stock to global shock should be tougher than the conventional part, given the fact that Shariah stocks have an underlying asset to support the paper. This hypothesis is supported by Kassim (2013), who argues that the effect of the global financial crisis on Shariah stocks is less severe in comparison with conventional stocks. On the other side, the commodity market is increasingly driven by the conventional system and less by Islamic fundamentals, providing inadequate space for innovations in Shariah-compliant products. Empirical studies have also found a high correlation between interest rate and Shariah equity markets (Alaoui, 2015).

The literature claims that interest rates have a negative impact on stock market performance. An increase in interest rates would discourage investors to make high-risk stock market investments. Instead, they would prefer to make low-risk interest investments with security such as fixed deposits, savings certificates and treasury bills (French et al., 1987). Central banks usually use interest rates as a tool to tame inflationary pressures. When the central bank changes policy rates, it affects the stock market performance indirectly and the overall economic performance afterwards. Thus, it is crucial to determine ideal interest rate as a policy instrument (Pallegedara, 2012). Many studies have looked at the reaction of the stock market to monetary policy shocks during the GFC. The literature revealed an unexpected change in the effect of nominal interest rates on real stock prices. Fred and Jane (2008) posit that interest rate cut is a major cause of the U.S. mortgage financial crisis in 2008, while the manipulation of interest rates has a damaging effect on lenders and borrowers. Some scholars (Craine and Martin, 2003; Bernanke and Kuttner, 2005) focused on the instant stock market response and reported that a normalised increase of 100-basis points in the Fed funds rate. Such increase is also associated with an instant decrease in broad U.S stock indexes that ranges from 2.2% to 9%, depending on the sample and estimation method used. Moreover, there is astronger response of stock returns to sudden changes in the Federal funds target rate during recessions and strict credit market conditions (Basistha and Kurov, 2008). The findings are consistent with the credit channel of monetary policy transmission.

Rigobon and Sack (2004) relied on a heteroskedasticity-based approach to track the changes in the covariance between interest rates and asset prices when the variance of the monetary policy shock is shifted. Bjornland and Leitemo (2008) found an interdependence between the interest rate setting and real stock prices, specifically U.S. monetary policy and S&P 500. In other words, when a stock price shock increases real stock prices by 1%, it leads to an increase in the interest rate approximately 4 basis points. However, real stock prices slump by 7% to 9% due to a monetary policy shock that increases the Federal fund rate by 100 basis points. Huang et al. (2016) looked into the response of the U.S. stock returns (S&P 500, DJIA, and NASDAQ) to the U.S. monetary policy shifts. The scholars identified negative U.S. real interest rates continuously since January 28, 2009. The studies discussed have provided a connection between interest rate fluctuations and equity returns. This finding suggests that interest rates and stock prices can move in the same direction after the changes in financial stability during the GFC, which may also give rise to a positive relationship

between interest rates and stock prices. According to Ferrer et al. (2016), flight-to-quality occurs during financial turmoil because investors shift their capital away from stocks to other low-risk investments (e.g., government bonds). This process does not yield long-term government bonds significantly because of the increasing demand for safer security. Therefore, the demand generates a positive correlation between changes in yields on sovereign bonds and stock returns.

Lastrapes (1998) and Rapach (2001) utilised a VAR model with solely long-run (neutrality) restrictions to study monetary shocks. Both researchers identified a stronger effect of the monetary shock on the stock market. Nevertheless, the opposite response from the stock market to systematic monetary policy can either be neglected or solved. Li et al. (2010) investigated whether trade and financial market openness can influence the transmission to stock prices during monetary policy shocks. In their research, in Canada, the instant response of stock prices to a domestic contractionary monetary policy shock is minimal and the dynamic response is brief. In the U.S., the instant response of stock prices to a similar shock is relatively huge and the dynamic response is continuous. Rosa (2011) examined the relationship between monetary policy and stock prices during the financial turbulence in August 2007 by looking at the influence of Federal Reserve's decisions and statements on the U.S. stock and volatility indexes according to Dow Jones Industrial Average, NASDAQ 100, S&P 500 and VIX. The results show that the components of policy actions caused statistical and economical consequences for equity indexes. with a stronger explanatory power of the reaction of stock prices to monetary policy. He asserts that sensitivity analysis substantiates that central bank communication is expected to yield stock returns.

3. Metodology

The major aim of our study is to investigate the effect of the GFC on the correlation between stock markets and interest rate at different time scales or investment horizons or stock holding periods. This issue cannot be addressed by the conventional regression analysis which can estimate the correlation of two assets over the whole sample period (not between two specified time-scales or stock-holding periods). The standard time series Vector error-correction model can estimate the correlation of two assets in the unspecified short and long run (not between two specified time scales or stock holding periods). The wavelet technique is, therefore, the most appropriate tool to address the issue of estimating the correlation of two assets between two specified time scales or investment horizons or stock holding periods. Furthermore, technically, the advantages of wavelet analysis over the multivariate analysis are as follows: wavelet transforms allow us to introduce multi-resolution approximation, and multi-scale nonparametric regression or smoothing, in a natural and integrated way into the data analysis. Our applications illustrate the relevance of this new perspective for data analysis. While multivariate analysis covers a broad array of techniques to provide insight into correlation amongst a set of predetermined factors, the limitations of such procedures restrict one to use strict parametric and distributional dependent assumptions that may not always hold. In fact, literature has shown that such assumptions rarely hold in financial data observed over time as attributes of non-normality are often prevalent. The wavelet analysis is free from these limitations of assumptions. Further, unlike the wavelet analysis, the multivariate analysis is often used in static analysis of data (as opposed to dynamic relationships), often outside the scope of examinations of data dependencies across time and frequency domain. As this was a clear and identified motivation of our research, our choice of methods was driven by its utility and scope to provide insights in the most efficient and powerful manner possible, to the underlying question we aimed to examine.

The basic wavelets in any wavelet family are classified into two types, namely father wavelets φ and mother wavelet ψ, and can be represented as follows:

Father wavelets $\qquad \int \varphi(t)dt = 1,$ and

Mother wavelets $\qquad \int \psi(t)dt = 0.$

The father wavelets are used for the low frequency, smooth components parts of a signal and for the trend components, whereas the mother wavelets are used for the high-frequency detail components and for deviation from the trend. A sequence of mother wavelets is used to represent a function, but only one father wavelet represents a function. A time series $f(t)$ can be decomposed by the wavelet transformation, and expressed as follows:

$$f(t) = \sum_k s_{J,k}\phi_{J,k}(t) + \sum_k d_{J,k}\psi_{J,k}(t) + \sum_k d_{J-1,k}\psi_{J-1,k}(t) + \ldots\ldots + \sum_k d_{1,k}\psi_{1,k}(t)$$

where, J is the number of multi-resolution levels, and k ranges from 1 to the number of coefficients in each level. The wavelet coefficients, $s_{J,k}$, $d_{J,k}$, …., $d_{1,k}$ are the wavelet transform coefficients and $\varphi_{J,k}(t)$ and $\psi_{j,k}(t)$ represent the approximating wavelets functions. The wavelets transformations can be expressed as:

$$s_{J,k} = \int \varphi_{J,k}(t)f(t)dt$$

$$d_{j,k} = \int \psi_{j,k}(t)f(t)dt, \quad \text{for} \quad j = 1,2,\ldots\ldots J$$

where J is the maximum integer such that 2^J takes value less than the number of observations. The detail coefficients, $d_{J,k}$, …., $d_{1,k}$, represent increasing finer level deviation from the smooth trend and $S_{J,k}$ which represents the smooth coefficient and capture the trend. The wavelet series approximation of the original series $f(t)$ can be expressed as follows:

f(t)=$S_{J,k}$(t)+$D_{J,k}$(t)+$D_{J-1,k}$(t)+…..+D_1(t).

where $S_{J,k}$ is the smooth signal and $D_{J,k}$, $D_{J-1,k}$, $D_{J-2,k}$….$D_{1,k}$ detailed signals. These smooth and detail the signals.

$$S_{J,k} = \sum_k s_{J,k}\phi_{J,k}(t), D_{J,k} = \sum_k d_{J,k}\psi_{J,k}(t), \quad \text{and} \quad D_{1,k} = \sum_k d_{1,k}\psi_{1,k}(t), \quad j = 1,2,\ldots,J-1.$$

The $S_{J,k}$, $D_{J,k}$, $D_{J-1,k}$, $D_{J-2,k}$….$D_{1,k}$ are listed in increasing theorder of the finer level components.

Data Collection

Weekly data[1] was collected to define the first log difference of the weekly stock price indexes of Indonesia. The data period from 31 December 2004 to 31 December 2012 was included in the analysis. Unit root test is one of the preliminary analyses of time series data. If a series is non-stationary, using first differences is a suitable choice. In this research, Augment Dickey–Fuller (ADF) test was adopted to examine whether the data employed contains any unit roots. To avoid sample selection biases, one suggestion is to separate the sample in three sub-samples that deal with the pre-

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[1]Daily data often incorporate too much noise as such weekly data is employed to have symmetry in the two time intervals in order to highlight as much as possible the effects of the recent financial crisis and quantitative easing on nominal interest rates and thus on the stock market (Huang et al., 2016).

crisis, crisis and post-crisis periods, to identify the appropriate breakpoint. This study set the beginning of the crisis at 5 October 2007 because the DJIA suddenly declined after reaching more than 14.000 points. Furthermore, with regard to the GFC, this study argues that crisis ended on June 5, 2009. This is because the U.S. government and U.S. Federal Reserve had committed $13.9 trillion, out of which $6.8 trillion had been spent, as of June 2009. So we opine that this particular date was a signal that the crisis had ended. Moreover, the New York Times also defined March 2009 as the "nadir of the crisis" and noted in 2011 that "Most stock markets around the world are at least 75 percent higher than they were then[2]. Therefore, according to our estimations, the GFC sample comprises different periods: pre-GFC (two and half years before the financial crisis event, i.e.from December 31 to September 24, 2007), GFC period (one and half year thereafter, i.e.from October 01, 2007 to May 25, 2009) and post-GFC (three and half years after the Lehman Brothers' collapse, i.e. from June 01, 2009 to December 26, 2012). This study employs the 3-month interbank offer rate attached to loans given and taken amongst banks for any excessive or inadequate liquidity over several months.

4. Result and Discussion

For starters, in order to proceed to the computation, the first step is empirical testing by determining the stationarity of the variables used. Ideally, the variables should be non-stationary in their level form, while in their first differenced form they should be stationary. The differenced form for each variable used is created by taking the difference of their log forms. It is depicted by conducting the Augmented Dickey-Fuller (ADF) Unit Root Test on each variable in both level and differenced form. We can see from Table 5.1 that the variables in the level form are non-stationary, since all the ADF(X) test statistics values are less than the ADF critical values 3.4309 at 95 percent. In addition, the variables in the first differenced form are stationary as the ADF(X) test statistics values are greater than ADF critical values 3.4303 at 95 percent.

Table 1: Summary Statistic

| Variables	Types	Mean	Stdv.	Skew	Kurt.	ADF Unit Root	
						Unit Root	First Diff.
Indonesia	Islamic	3,387	0,275	0,189	-1,462	-1.0529	-6.4480
	Conv.	3,305	0,305	-0,471	-0,799	-3.2577	-6.6765
	Int. Rate	0,946	0,096	-0,769	-0,528	-1.2210	-4.5398

WTC Result

Wavelet squared coherency analysis involves inputting two financial time series in a time/frequency. The output of the exercise is illustrated by contour plots as it involves three dimensions; frequency, time, and the wavelet squared coherency value. The wavelet squared coherency is indicated by a red level colour spectrum. Time and frequency extracted from the time-series are represented on the horizontal and vertical axes respectively. To simplify the interpretation,

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[2] Retrieved on 17 June 2017 from https://en.wikipedia.org/wiki/Financial_crisis_of_2007%E2%80%932008

the frequency is converted into time units (week), and ranged from the highest frequency to the lowest frequency (bottom of the plot). Consequently, through a visual assessment of the graphs, both time and frequency varying co-movements of each of the selected country's stock returns can be detected. The thick red continuous line in the figures presented isolates regions where the wavelet squared coherency is statistically significant at the 5 percent level.

The thick blue contour designates the 5 percent significance level against red noise which is estimated from Monte Carlo simulations using phase randomized surrogate series. The cone of influence, which indicates the region affected by edge effects, is shown with a lighter shade black line. The colour code for power ranges from blue (low power) to red (high power). Arrows indicate the phase difference between the two series. Arrows pointing to the right mean that the variables are 'in phase'. Arrows pointing to the left mean that the variables are 'out of phase'. To the left and up, the stock market is leading. To the left and down, the stock market is lagging. 'In phase'indicates that variables will be having a cyclical effect on each other and 'out of phase' or 'anti-phase' shows that variable will have an anti-cyclical effect on each other (Tiwari, 2012). As such, clear evidence on the lead-lag relationship between the three series with the application of WTC analysis and whether one variable influences or is influenced by the other through anti-cyclical or cyclical shocks is presented in detail. In what follows, these results would not have been drawn through the application of time series or the Fourier transformation analysis, if one could have attempted (Andrieș et al., 2014).

Figure 2: WTC Result
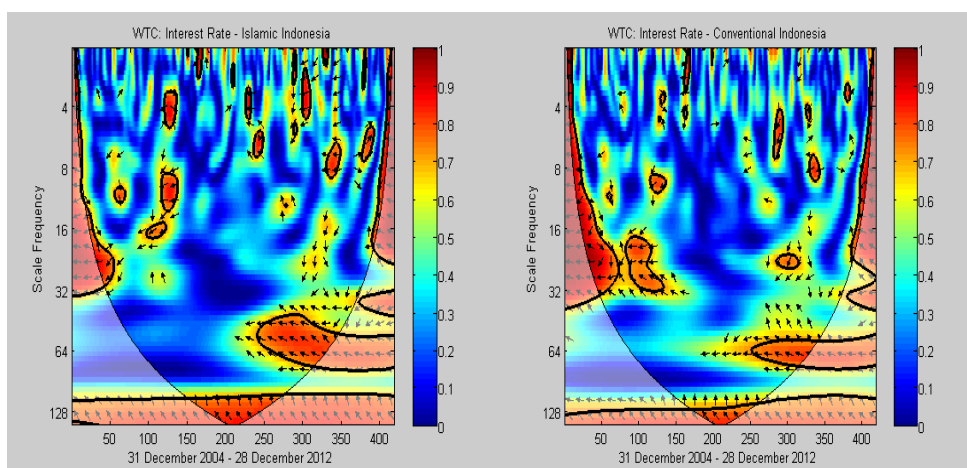
Indonesia is an emerging country neighbouring with Malaysia which has a more developed Islamic finance industry (Fig. 2). During the first four of GFC, the nexus between interest rate and stock market is not strong for both Islamic and conventional stock markets. This result is not surprising as the Indonesian financial system displays a strong bank-orientation. The fact is that the banking industries has traditionally had a greater real economy orientation compared to the stock markets. However, after crises the arrows for both Islamic and conventional Arrows pointing to the left and up mean that the variables are 'out of phase' the stock market is leading. Stock market and interest rate will be having an anti cyclical effect on each other (Tiwari, 2012). As such, clear evidence on the lead-lag relationship between the three series with the application of WTC analysis and whether one variable influences or is influenced by the other through anti-cyclical or cyclical shocks is presented in detail. In what follows, these results would not have been drawn through the application

of time series or the Fourier transformation analysis, if one could have attempted (Andrieș et al., 2014).

T test

To check the robustness the result we use a two-sample t-test, with unequal variances, to evaluate whether there is a significant increase in the wavelet correlation coefficients after financial incidents. We investigate all decomposition levels and retain period before, during and post-crisis with divided sample size. For instance, the shock period (I_1) and the non-shock period is (I_2). Let ρj (X, Y) $I1$ and ρj (X, Y) $I2$ be the wavelet correlations of two random variables (X, Y) in these two periods I_1 and I_2, respectively. The null hypothesis of the test:

$$H0: \rho j(X,Y)^{I1} - \rho j(X,Y)^{I2} = 0$$

As shown in Figure 3, the correlation between interest rate and stock market in Indonesia displays a decreased linkage in the first week, subsequently increasing gradually. Further, Table 5.59 confirms that the correlation shift is not significant in the all levels. The sign of the relationship is negative, indicating that they have moved in the opposite direction during later years. This negative association shows that the historically low levels of interest rates over the last few years could boost Indonesia's stock markets.

Figure 3: Wavelet Correlations between Indonesia and Interest Rate
(Level W1, W2, and W3)
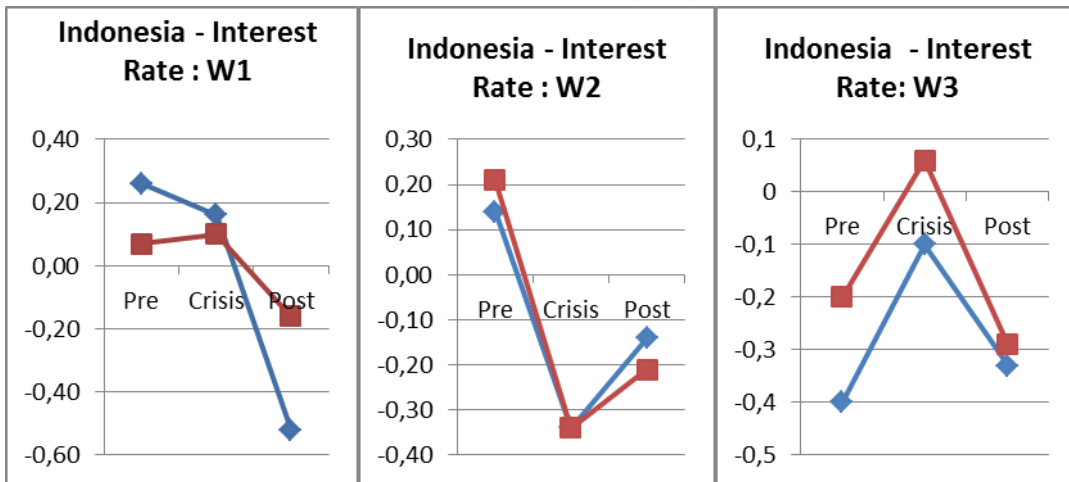
Table 2: T-Test Results Before and After Financial Turbulence Events,
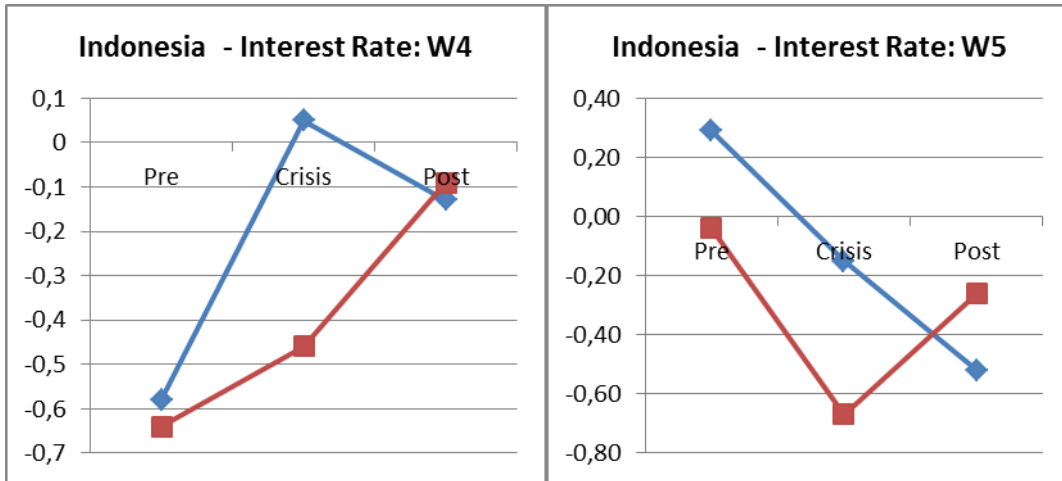**Indonesia and Interest Rate (Levels W1, W2, and W3)**

Stock	W1(2–4 weeks)			t-stat.	W2(4-8 weeks)			t-stat.	W3(16-32weeks)			t-stat.
	Correlation				Correlation				Correlation			
	Pre.	Crisis	Post		Pre.	Crisis	Post		Pre.	Crisis	Post	
Isl.	0.263	0.163	-0.522	0.020	0.146	-0.342	-0.142	-0.171	-0.408	-0.105	-0.337	-0.129
	0.072	0.105	-0.163	0.984	0.211	-0.340	-0.211	0.864	-0.207	0.064	-0.293	0.898

Conv.												

*Indicates the rejection of the null hypothesis of equal means at 10% critical value.

Figure 4 gives empirical evidence that, during the period of GFC, the correlation between the Islamic stock market and interest rate increases at Level 5 from 0.055 to -0.118 showing that investor could borrow the cheap fund to invest in the stock market. Indeed, in the shock period, both Islamic and conventional stock show that the correlation has negative sign. After 16 weeks, the correlation remains with the negative sign, demonstrating that the stock market and interest rate are conducive for further diversification. This observation is reinforced by the t-test results shown in Table 5.61.

Figure 4: Wavelet Correlations between Indonesia and Interest Rate (Levels W4 and W5)

Table 2: T-Test Results Before and After Financial Turbulence Events, Indonesia and Interest Rate (Levels W4 and W5)

Stock	W4(16-32 weeks)			t-stat.	W5(32-64 weeks)			t-stat.
	Correlation				Correlation			
	Pre.	Crisis	Post		Pre.	Crisis	Post	
Isl.	-0.582	0.055	-0.13`9	0.052	-0.355	-0.118	-0.766	-1.078
Conv.	-0.641	-0.463	-0.098	0.959	-0.594	-0.317	-0.378	0.283

*Indicates the rejection of the null hypothesis of equal means at 10% critical value.

The result show similar way with the wavelet method showing that interest rate and Islamic stock market have anticyclical effect or negative correlation mainly for more than 4 weeks nexus.

5. Conclusion

The purpose of the research was to test whether the global shock will change the correlation of interest rate and stock market both in the Islamic and conventional market in Indonesia. The empirical results show that the stockmarket is connected with the development of low-frequency interest rates, although the extent of linkage varies markedly, depending on the time horizon considered. On the one hand, in the high frequency, the correlation tends to be below that of the crisis period. This is similar to the findings of a previous study by Martinez (2015) which stated that the nexus between interest rate and the stock market is weak at shorter time horizons (high frequencies), but becomes stronger at longer horizons (low frequencies). In turn, investors with low-frequency horizons (more than 8 weeks) are more likely to follow macroeconomic fundamentals, such as interest rates, in their investment decisions in contrast to investors with a shorter time frame such as speculative traders. These results are in line with the study carried out by Andries et al. (2014) which investigated the patterns of co-movement of interest rates in India in the period between July 1997 and December 2010, using the wavelet methodology, and suggested that stock prices and interest rates are linked. In some countries, the cross wavelet results show that stock price movements follow the interest rate signals. On the other hand, central banks usually use interest rates as a tool to combat inflation in a country. If a central bank changes the interest rate, it would indirectly affect the stock market performance. It eventually would have an impact on the overall economic development of the country. Thus, the determination of ideal interest rate is critical for monetary policy. Finally, our evidence of cyclical variation in the response of stocks to interest rate should be useful to central banks by helping them predict the effect of a target rate change on the stock market in the certain time scales. Moreover, it is also noted that the Islamic stock price is strongly dependent on its conventional counterpart.

6. Implications for policy makers

The monetary conditions have clear influences on stock market co-movements in crisis periods and therefore monetary policy can be used to prevent the contagion phenomenon by making proactive policy adjustments. In the face of a global financial crisis, the governments can increase or decrease the interest rate to prevent the steep fall of stock market price. In other words, since interest rate changes have a serious impact in the stock market, harmonisation of monetary policies mainly in developed countries can contribute to a decrease in the contagion potential on the stock markets. The finding reveals that the Islamic equity market remains sensitive to the monetary tools used in the conventional system in the developed countries. In turn, the volatility in stock market returns should attract the attention of the regulators of the Islamic stock markets to improve their investment climate through effective financial regulation and prudential actions according to Islamic perspectives to make Islamic stock markets less sensitive to shocks (Alaoui, 2015).

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