Covid-19, Financial Markets (Islamic vs Non-Islamic), and Exchange Rate: Does the Malaysian Market Offers Diversification Opportunities to the Investors?

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Abstract: We explore the impact of Covid-19 towards Islamic and non-Islamic financial markets in Malaysia. We employ the wavelet coherency approach (WCA) which allows a deeper investigation of the relationship between the selected variables in terms time-frequency domain. We document that (i) Islamic capital markets represented by FTSEBMEI and MyETFDJIMMT25 are performing better during the Covid-19 period and also offer a greater investment opportunity to the investors for diversification purposes, (ii) non-Islamic index, FTSEBMKLCI, was less affected during this pandemic, and the market offers better risk and optimal diversification benefits to the investors as time progresses, and (iii) exchange rate appears to be more stable and within the phase category, indicating the co-movements are relatively strong in smaller scales. Understanding the impact of Covid-19 on the financial markets will lend to a better portfolio investment design which considers return and risk.

Introduction

Archaeologically, countries and investors have been affected by numerous financial crises. According to Kindleberger (1978), financial crises occur mainly due to economic crises which burst from a pro-cyclical change in the supply of credit in the market. However, the Covid-19 pandemic has turned the world upside down and resulted in a serious health crisis. Emerging from Wuhan, China, on 23rd January 2020, Covid-19 cases steadily escalated in Iran and Italy and subsequently the US in the middle of March. It caused the US government to announce a national state of emergency and resulted in a follow-the-crowd hypothesis, as most other countries announced the same move to reduce the outbreak of Covid-19. The pandemic has caused a tremendous impact on our social life as well as our wellbeing. It has also been detrimental to the financial markets and economic activity. Businesses were immobilized and closed in order to hinder the greater risk of Covid-19. Record analysis by the World Health Organisation shows that Dow Jones Industrial Average (DJIA) and S&P500 indices were affected due to Covid-19 by 33% and 29% on March 20, 2020 (World Economic Forum, 2020). Furthermore, FTSE100 index performance shows that UK main index observed a significant drop of 24.80% while Nikkei–225 index recorded a 20% drop. This is a clear evidence that the markets are reacting negatively towards the pandemic. The recent literature also provides consistent indication of the financial markets' response to Ccovid-19. Studies by Zhang et al. (2020), Baig et al. (2020), Al-Awadhi et al. (2020), and Rameli and Wagner (2020) confirm that there is a strong negative association and shock to market return and liquidity involving the growth cases of Covid-19 which also has a huge impact to the firm.

Using the hypothesis related to stock market returns (Ibbotson & Chen, 2003), we argue that the progression of business and its productivity plus the economic cycle determine the stock market performance. Countries worldwide have either implemented full or partial lockdown to disrupt the chain of this pandemic which subsequently brought to the disruption of real economic activities and contributed to a demand and supply breakdown in the market (Eichenbaun et al., 2020; McKibbin & Fernando, 2020). The aggressive withdrawal of investment funds from equity, forex, and many other investment platforms has resulted in native return, higher volatility, and higher trading volume.

Following the institutional theory which can be found in the literature (North, 1990; 1991; Khanna & Palepu, 1997), we believe that the impact of Covid-19 may react differently in the context of emerging economies as compared to developed countries. Existing studies have documented differences in investment behaviors between emerging economies and developed markets. Following the overreaction hypothesis (De Bondt & Thaler, 1985; Narayan et al., 2021), we argue that the market tends to overreact given this Covid-19 pandemic and will resettle itself as more initiatives are taken by policymakers and the government, such as the development of vaccinations worldwide to counter this pandemic.

Recent studies concerning Covid-19 are growing rapidly. Zhang et al. (2020) and Ashraf (2020) confirmed that the impacts of Covid-19 were tremendous and its impacts on stock market return varied across countries worldwide. In a different dimension, Conlon and McGee (2020) investigated whether bitcoin can be considered as a safe investment during the Covid-19 outbreak. Following that, Thaker and Ah Mand (2021), focusing on ASEAN countries, attempted to analyze and identify which time-horizon bitcoin is suitable for investment purposes in the era of Covid-19. In their study, Yarovaya et al. (2020) results show that there is no abnormal and herding behavior in cryptocurrency markets during this health crisis. Offering another perspective, several of the literature examined how Covid-19 is affecting the oil and gas industry (Devpura & Narayan, 2020; Huang & Zheng, 2020; Liu et al., 2020; Prabheesh et al., 2020; Salisu & Adediran, 2020). Using economic policy uncertainty (EPU), Sharif et al. (2020) show that US EPU tends to be lower during Covid-19 than the geopolitical risks. Many studies concerning the impacts of Covid-19 on stock markets in the year 2020 have also been conducted (Ali et al., 2020; Lyócsa & Molnár, 2020; Mishra et al., 2020; Zhang et al., 2020; Thaker & Ah Mand 2021). There have been studies on exchange rates (Iyke, 2020), global trade and insurance (Wang et al., 2020), sentimental and emotional fear (Chen et al., 2020; Salisu & Akanni, 2020), and on the economic sectoral effects (Gu et al., 2020; Xiong et al., 2020).

From the above recent literature, it is very clear that none of the studies focuses on the impact of Covid-19 towards Islamic financial markets. With this initiative, we focus on the impact of Covid-19 towards the Islamic capital markets in Malaysia. This study also attempts to determine whether Malaysia's capital markets still offer diversification opportunities to investors during this pandemic. Additionally, we also answer the analytical work on equity market overreaction done by Narayan et al. (2021) using Malaysia as a sample. To further distinguish our paper with the above literature, this paper also investigates the impact of Covid-19 on the Malaysian exchange rate. Our study is expected to fill this annulled scope within the existing literature by examining the Islamic financial market and how it can contribute to the individual or portfolio investors' decisions during this pandemic.

Methodology

Data Collection

For the data collection, we used daily data series from 2nd February 2020 until 15th January 2021. The indexed data were mainly collected from https://www.wsj.com, https://www.investing.com, and https://www.bursamalaysia.com. Further, Covid-19 was measured by the number of Covid-19 cases (cumulative figure obtained at https://www.moh.gov.my, Ministry of Health Malaysia). We converted

the index values using the formula of $R = ln[\frac{Vi_t - Vi_{t-1}}{Vi_{t-1}}]$ where R represents return for indexes, Vi_t is current index value, while Vi_{t-1} is the previous value and *ln* represents natural log. We excluded some years given the fact of missing data of stock indexes during the analysis period. Details of the indexes used are shown in the Table 1.

Table 1. Description of Variables

Symbol	Definition
Covid-19	Cumulative number of Covid-19 cases in Malaysia
FTSEBMKLCI	FTSE Bursa Malaysia KLCI (non-Islamic)
FTSEBMEI	FTSE Bursa Malaysia EMAS Index (Islamic)
MyETFDJIMMT25	MyETF Dow Jones Islamic Market Malaysia Titans 25 (Islamic Exchange Traded Fund, ETF)
Exchange Rate	USD/MYR

Wavelet Coherency Approach (WCA)

Researches in finance and economics are witnessing the growth of wavelet transformation analysis. However, we do not anticipate to count the advantages of wavelet methodology even though there are several aspects of wavelet methodology that suit the model of the current study. By implementing wavelet analysis, researchers are able to fetch high-quality information confined into a signal in various scales.

Using a wavelet transform requires a restricted waveform expressed as Ψ(t)W(t) commonly called a mother wavelet. While the mother wavelet integrates to zero, its harmonizing normalized counterpart ϕ integrates to 1 and is known as a father wavelet. The former is used for interrogating signals in greater detail and is, therefore, more relevant for higher frequency testing. As such, we go on to build a wavelet function by forging a series of plans including mother and father wavelets. This is achieved via the mathematical formulation below:

$$\psi_{s,k}(t) = \frac{\psi(\frac{t}{2^s} - k)}{2^{\frac{j}{2}}} \tag{1}$$

$$\phi_{s,k}(t) = \frac{\phi(\frac{t}{2^s} - k)}{2^{\frac{s}{2}}} \tag{2}$$

In the two equations above, s = 1, …, S, S and k are scaling and translation parameters respectively. Also, the wavelet transformation of a signal can be represented as:

$$y(t) = \sum_k \theta_{s,k} \phi_{s,k}(t) + \sum_k d_{s,k} \psi_{s,k}(t) + \sum_k d_{s-1,k} \psi_{s-1,k}(t) + \ldots + \sum_k d_{1,k} \phi_{1,k}(t) \tag{3}$$

The smooth coefficient is $\theta_{s,k} = \int y(t) \phi_{s,k}(t) dt$ and detail coefficient is $d_{s,k} = \int y(t) \psi_{s,k}(t) dt$. Together, $\theta_{s,k}$ and $d_{s,k}$ represent how much a particular wavelet function contributes to the overall signal. Following the methodology of Rua and Nunes (2009) and Kristoufek (2013), I have the wavelet Morlet as follow:

$$\psi_{u,s}(t) = \frac{1}{\sqrt{s}} \psi(\frac{t-u}{s}), \varphi(.)L^2 \subset \mathbb{R} \tag{4}$$

At this stage, the cross-wavelet spectrum of Covid-19 and market indices for individual market series are:

$$W^1_{Markets,Returns}(\tau, s) = W_{markets}(\tau, s) W^*_{returns}(\tau, s) \tag{5}$$

In accordance, the cross-wavelet spectrum's cross-coherency takes the absolute value of the squares of the smoothed spectrums, as follow:

$$CC^2_{(\tau,s)} = \frac{|S(s^{-1}W_{x,y}(\tau,s)|^2}{S(s^{-1}|W_x(\tau,s)|^2)S(s^{-1}|W_y(\tau,s)|^2)} \tag{6}$$

Equation 6 is useful for capturing the degree to which two time-series co-move across time and frequencies, an improvement over Fourier transforms which deal with frequencies alone. A $CC^2_{(\tau,s)}$ value ranges from 0 to 1, where 0 indicates no co-movement and 1 perfect strong co-movement.

Results and Discussion

Descriptive Statistics

Table 2 reports the descriptive statistics for the data used in this study. The mean for FTSEBMEI and MyETFDJIMMT25 recorded the highest mean value during the Covid-19 pandemic while FTSEBMKLCI just scored 1512.180 points. This indicates that the Shariah index relatively performed fine but the diversion of mean value which is represented by standard deviation shows that FTSEBMEI and MyETFDJIMMT25 obtained larger figures as compared to FTSEBMKLCI. Thus, Covid-19 has impacted the markets but at the same time, the markets are progressing fine as indicated by the mean value. The exchange rate recorded the mean and standard deviation of 4.209 and 0.1054 respectively.

Table 2: Descriptive Statistics of the Data Used

Description	COVID19	FTSEBMKLCI	FTSEBMEI	MyETFDJIMMT25	Exchange Rate
Mean	33663.80	1512.180	10755.25	4363.531	4.209279
Median	10193.00	1519.375	10937.71	1.350000	4.193000
Maximum	151066.0	1684.580	12100.99	11103.52	4.442500
Minimum	7417.000	1219.720	8257.780	0.860000	4.006500
Std. Dev.	37944.33	94.66408	802.5524	5033.646	0.105443
Skewness	1.464994	-0.720585	-0.886112	0.300601	0.021063
Kurtosis	3.963604	3.083415	3.273579	1.124380	1.974357
Jarque-Bera	93.54804	20.49199	31.62032	38.14736	10.36156
Probability	0.000000	0.000035	0.000000	0.000000	0.005624
Sum	7944656.	356874.6	2538238.	1029793.	993.3898
Sum Sq. Dev.	3.38E+11	2105903.	1.51E+08	5.95E+09	2.612780
Observations	236	236	236	236	236

The Result of Wavelet Coherency Approach (WCA)

This section presents a discussion on the WCA. The horizontal line indicates the number of years whereas the vertical line represents the scales (the frequency element) combined with the small frequency range closest to the initial Covid-19 cases. Red areas outline the existence of higher coherency of Covid-19 with market indexes while blue shows the lower co-movement between Covid-19 and the selected variables. Moreover, the black solid silhouettes resembling the co-movement are significant at 5% (statistically) given a specific time and frequency. The change of the WCA phase postulates the dynamic association of the selected variables by zoom into the lead-lag relationship between the paired sets (e.g. A and B). The arrows represent the lead-lag relationship between the series. For example, if the phase arrow points to the right, this shows the co-movement is positive and under the category of "in-phase" (A and B). If the arrow points to the left, the association is within the out-of-phase category (negative co-movement: A and B). If the arrow points down, this implies the value of A leads to the value of B. If the arrow points up, then B leads to A. The benchmark is based on Covid-19 against another.
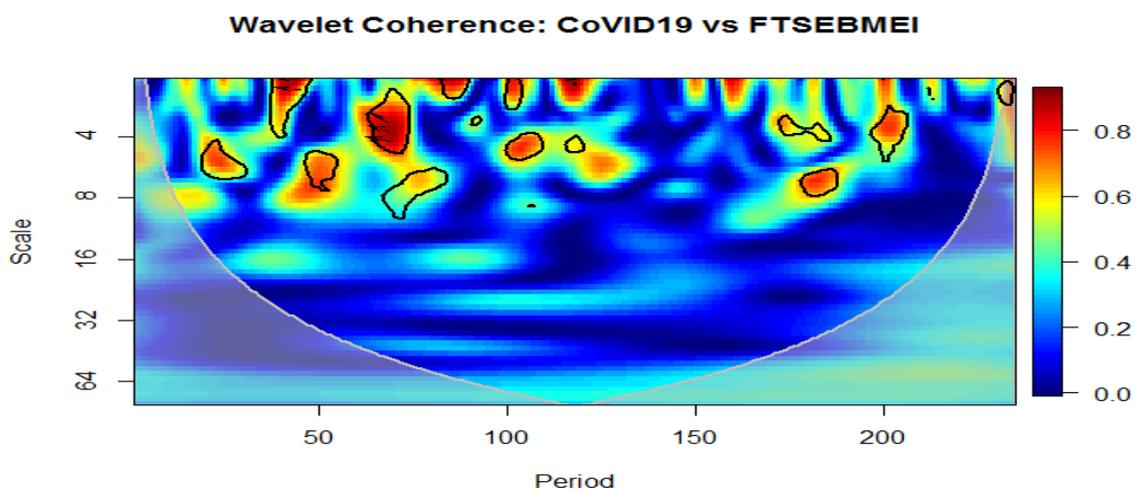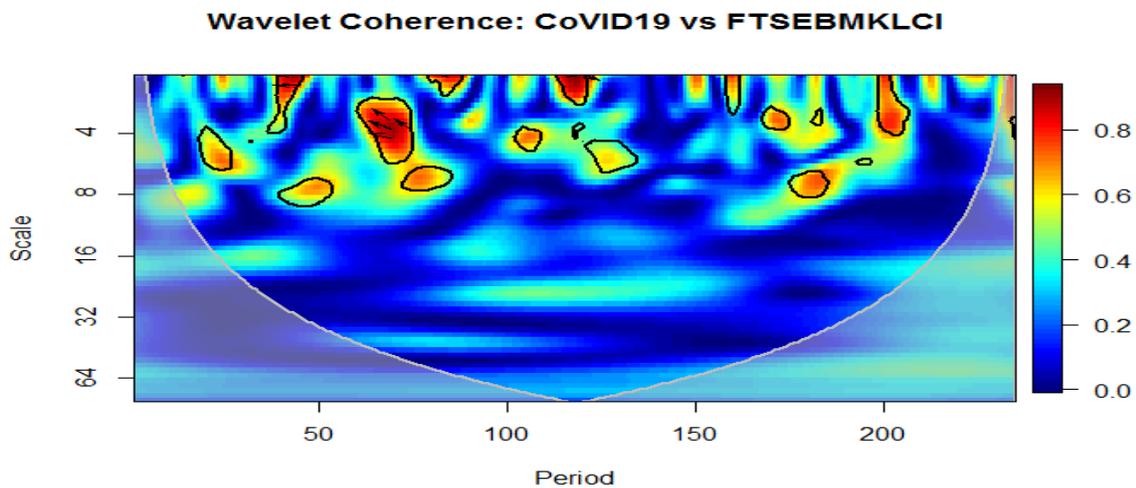
Discussion of WCA Analysis

The WCA results for COVID-19 and FTSEBMKLCI in Figure 1 show blue covering a large proportion of the cone. This reveals that the pandemic's impact on FTSEBMKLCI is significantly lower. The coherency level is relatively lower from 16 onwards. The impact of Covid-19 is prevalent at the scales of 4 to 8, and this postulates that Covid-19 has influenced the movement of FTSEBMKLCI in the short term as suggested by the red color areas at that particular scale. During the period of Covid-19, valuation based on analyst report basically indicates that Malaysia's equity markets are undervalued but nevertheless offer a great platform for investment. Hence, investors see this as a time to purchase at a lower price and switch their attention towards plantation, glove and healthcare, construction, and oil and gas industries for investment purposes (CIMB, 2020). In terms of the lead-lag relationship, arrows pointing to the left could only be observed at scales of 8 to 4, indicating that FTSEBMKLCI and Covid-19 are in the out of phase category (no significant relationship). As far as Covid-19 and FTSEBMKLCI are concerned, investors (retails or institutional) can still consider the Malaysian markets a *"safe zone"* (long-term) for them to make investments as the WCA has shown a favorable outcome (i.e. Covid-19 has a lesser impact on FTSEBMKLCI). Furthermore, the investors' confidence towards Malaysia's markets is good given the implementation of Budget 2021 which focuses on the economic recovery efforts due to Covid-19 (Star Newspaper, 2020).

Similar to the FTSEBMKLCI, the impact of COVID-19 towards the Islamic capital market as represented by FTSEBMEI is also relatively low (see Figure 2). The results of WCA prevail the blue color dominating the red color in the cone, indicating the co-movement between these two variables is lesser. The dominancy can be observed aggressively in the scales of 8 onwards, whereas red color dominancy is evidenced in the scales of 0 to 8. Looking back at history (from 2002 to 2012 during the 2008/9 global financial crisis and SARS outbreak), the Dow Jones Islamic Market Index performed better than the Dow Jones Industrial Average Index by 14.26%. Based on these facts, the Islamic capital market is doing well long-term wise and also during higher volatility times. Nagayev et al. (2016) and Rahim and Masih (2016) highlighted that Islamic equities are the better choice because of their stability. Slowly, FTSEBMKLCI and FTSEBMEI both tend to stabilize the day news on vaccinations are out. Therefore, markets will stabilize quicker but not rebound in the long term. At this point in time, economic activities may take a while to stabilize and V-shaped recovery is not possible in the short term. The lead-lag relationship indicates that there are arrows pointing to the left at the scales of 0 to 8, meaning that the association between Covid-19 and FTSEBMEI is out of phase. Therefore, based on the WCA analysis, the Islamic capital market is considered as a *"safe zone"* for investors who would like to invest in Malaysia and enjoy diversified benefits.

The WCA for Covid-19 and Islamic Exchange Traded Funds (ETF) represented by MyETFDJIMMT25 shows a mixed outcome (see Figure 3). It is noticeable that red dominated the scales of 16-32 and 32-64. This means that there is a higher coherency between Covid-19 and MyETFDJIMMT25. On the scales of 8 to 16, blue appears smaller and in short scales of 0-8, as there are red color areas in the cone. Although the equity market offers a sell-off and a time for buying during the pandemic, investors need to go for ETF investment for medium and long-term profit. The lead-lad relationship is indicated in the scales of 16 to 32 as the arrows point up (MyETFDJIMMT25 leads Covid-19), while in the 64 scales, the arrows point down (Covid-19 leads MyETFDJIMMT25). In the case of smaller scales, the arrows point to the left (out phase category). Thus, the results are mixed in the context of scales. As reported by the Edge Report (2020), Shariah funds are less affected by the pandemic and perform relatively better due to the prohibition of non-Shariah complaint funds which received huge hits and delayed recovery. Due to better sector allocation, especially in Shariah-compliant funds, MyETFDJIMMT25 is, therefore, a good source of investment opportunity particularly for

institutional investors who like to invest in ETF and also design a better risk and optimal diversification (Sakti et al., 2018).

Finally, the WCA for exchange rate (USD/MYR) indicates blue areas dominating red (scales 8 to 64) (see Figure 4). In the shorter scales, red seems to be more prevalent due to the fact the economy was closed and the ringgit was hit. As time progresses, positive sentiment, government policies, vaccines development, and slow re-opening of economic activities have slowly improved the ringgit performance (Star Newspaper, 2020). In 2020, MYR continued to be one of the strongest currencies in South-East Asia and investors' confidence boosted with the launch of various projects by Malaysia's government such as Bandar Malaysia. Apparently, the government's ongoing initiatives also play an important role in the performance of MYR and contribute to multiplier effects in various economic sectors and investment markets. The lead-lag relationship in the scales of 4 to 8 shows the arrows pointing to the right, meaning that there is a positive relationship between Covid-19 and MYR (in-phase category).
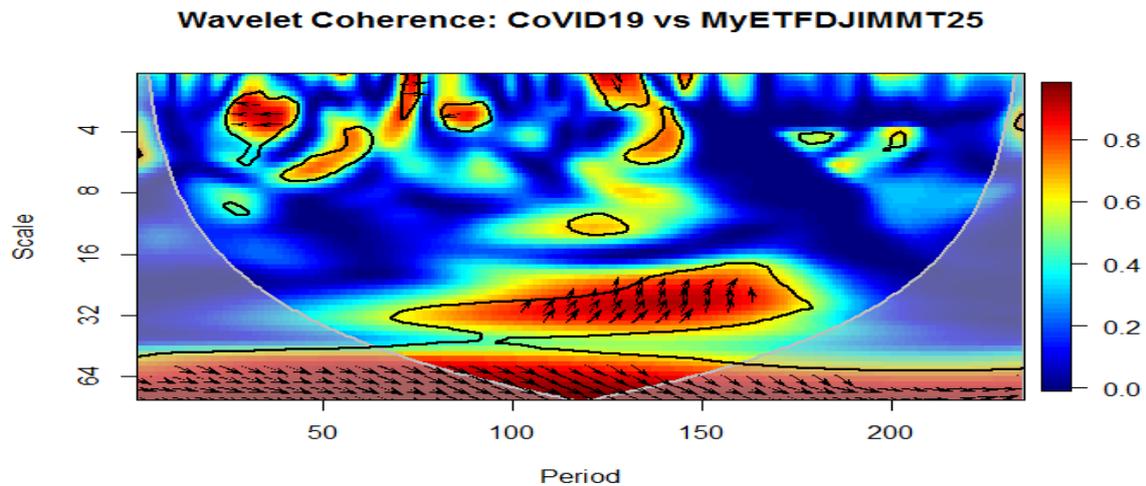

Figure 1. WCA of Covid-19 vs FTSEBMKLCI

Figure 2. WCA of Covid-19 vs FTSEBMEI

Wavelet Coherence: CoVID19 vs MyETFDJIMMT25

Figure 3. WCA of Covid-19 vs MyETFDJIMMT25

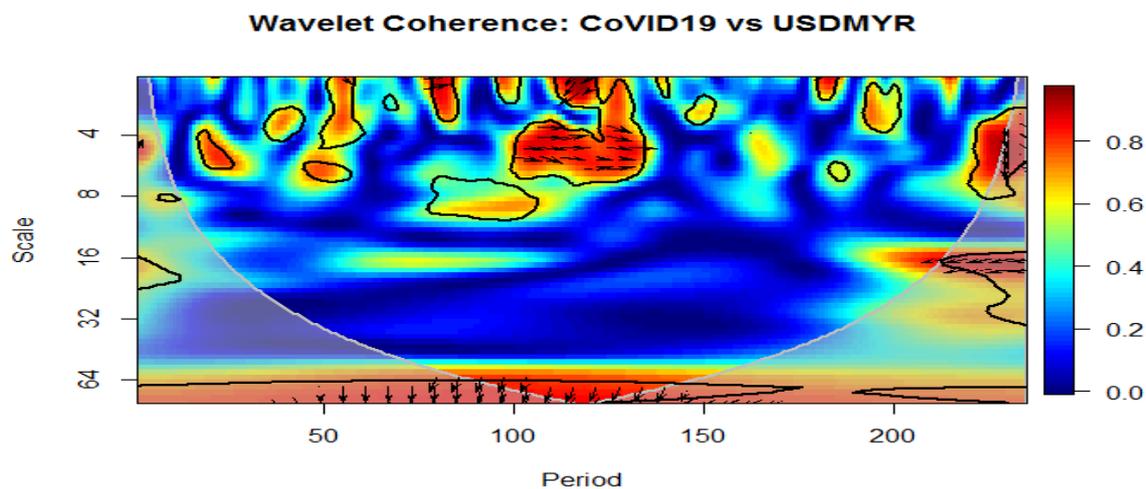**Wavelet Coherence: CoVID19 vs USDMYR**

Figure 4. WCA of Covid-19 vs Exchange Rate

Conclusion and Recommendations

This paper explored how Covid-19 has impacted the capital markets in Malaysia. We used Islamic versus non- Islamic capital markets for comparison purposes and to see whether these markets offer diversification benefits to the investors or vice versa. Using daily sample data of Covid-19 cases and time-frequency domain analysis, we found the following key findings: (i) Islamic capital markets represented by FTSEBMEI and MyETFDJIMMT25 performed better during the Covid-19 period and also offered a greater investment opportunity to the investors for diversification purposes, (ii) non-Islamic index, FTSEBMKLCI, was less affected during this pandemic, and as time progresses, the market offered better risk and optimal diversification benefits to the investors, and (iii) exchange rate seemed to be more stable and in the phase category, indicating the co-movement were relatively strong in smaller scales. Thus, to answer the work on equity market overreaction by Narayan et al. (2021), we found the two markets' (Islamic and non-Islamic markets) overreaction appeared to be more stable with ongoing economic policies implemented by the government. Future studies should look at how the markets are interconnected, firms (Shariah vs non-Shariah) performance during Covid-19, and the supply chain during the pandemic.

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