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## Does Investor Attention Matter? Fresh evidences from Wavelet Approach

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### ABSTRACT

*The COVID-19 pandemic drastically damaged business activities that not only affected conventional financial markets but also upset Islamic securities. Given the severity of the recent pandemic, this study looked at the returns of the investor attention index, Islamic bonds, and stock indexes in the occurrence of the ADS business condition index. Bivariate and multivariate wavelet analysis was employed on the daily data from January 2, 2020, to July 27, 2020. The study results indicate that before April 2020, there was a negative coherence between the investor attention index and the ADS, Islamic bonds, and stock returns. After that date, however, there is a positive relationship between the attention index and Islamic bonds. In addition, the relationship between investors' attention and the ADS index shows both short-term and long-term correlations, but the long-term correlations are clearer. It has implications for household investors by empirically revealing the significance of Google trends for Islamic capital markets in the pre and during pandemic situation. Our results show that the way investors use the Google search engine is a key factor in how prices respond to new information.*

### Keywords

Investor Attention Index, Google Search Volume, ADS Business Condition Index, Islamic Stocks and Bonds, Wavelet Analysis

### JEL Classification

D80, C91, D19

## 1. Introduction

The global COVID-19 pandemic traumatized the global financial and economic conditions, led by that of the US, after an exponential increase in both the number of patients and deaths since January 2020 onward. The COVID-19 epidemic shattered the US economy

massively (Thorbecke, 2020); stock market volatility reached an all-time high, surpassing previous highs in December 2008, October 1987, and the 1929 market crash (Baker, Bloom, Davis, & Kost, 2020). The virus spread sporadically in China from mid-January 2020. However, the world, including the US, gave it due attention in March 2020, after WHO officially declared it as a global pandemic. The late response deterred the US household's attention to COVID-19's social and economic impacts. US households realized the severity of the situation after the government announced the COVID-19 emergency policy to shut down business activities. The anxiety induced by the depressed situation caused a more severe impact on the US financial market in March 2020 than in March 2019. Risk-averse household investors paid more attention to seeking shelter by investing in alternative investments (Conlon, Corbet, & McGee, 2020). Extant literature suggests that Islamic financial institutions and Islamic stocks are more resilient and perform better in adverse market conditions (Al-Khazali et al., 2014; Farooq & Zaheer, 2015). During the coming COVID-19 crisis, it is important to look into the link between the investors' attention index and Islamic stocks and bonds.

The capacity attention theory explains that individuals use more mental effort when the difficulty level of the situation is high; the higher the complexity or seriousness, the higher attention is paid (Kehneman, 1973). Using Google search volume as a measure of investor attention, Smales (2020a) established that the US stock returns are negative due to high investor attention towards the COVID-19 pandemic. However, Smales (2020b) reports that higher investors' attention also led to higher stock returns in a few sectors. It implies that investors' attention may have a negative or positive influence on stock returns depending on their understanding of the relationship between business conditions and the characteristics of the financial asset. Moreover, the relationship may be strong if the shift in investors' attention is collective over time (Ballinari, Audrino, & Sigrist, 2022). Using Google search volume, Akarsu and Suer (2022) investigated investor attention effects on stock returns. They found that investors pay more attention to stock returns in both developed and developing countries. Chen, Tang, Yao, and Zhou (2021) used principal component analysis and partial least square methods to construct investor attention to examine stock returns. They reported that the investor attention index's predictive capability is mostly due to the reversal of transient price pressure and the greater forecasting ability for riskier stocks. Dong, Wu, Fang, Gozgor, and Yan (2022) developed a theoretical model to explain how investor attention influences equity returns. They found a negative (positive) link between the fraction of continuous attention and cross-section stock returns. Nevertheless, none of the previous studies have focused on the time-frequency coherence of investor attention, particularly in the Islamic capital market. So,

the study looked at the relationship between investors' attention, the Aruoba-Diebold-Scotti (ADS) business conditions index (a proxy for business conditions), and the returns on Islamic stocks and Islamic bond indexes.

This research accords with the empirical literature in three unique manners. First, it employs the capacity attention theory introduced by Kehneman (1973) in the framework of the COVID-19 epidemic. It postulates that mental energy is concentrated in attention, which is dependent upon suitable resources to fulfill situational attentional demand for a given task. There is a direct proportionality between the level of mental effort and attention and the level of task difficulty. Second, as Islamic stocks and bonds are considered safe havens and are expected to perform better in uncertain and vulnerable times (Razak et al., 2016), we explore the coherency among the investor attention index, the ADS index, and Islamic bond and stock indices. Lastly, as far as the researchers know, we are the first to look at how the investor attention index, the ADS business conditions index, and the Islamic bond and stock indices in the US are linked and how they change over time.

The rest of the article goes like this: Section 2 talks about the data and empirical approach; Section 3 talks about the main conclusions; and Section 4 gives the conclusions.

## **2. Research Methods**

### **2.1 Data Description**

This research used daily data from January 2, 2020, to July 27, 2020 for the COVID-19 induced investors' attention index, the ADS business condition index, and Islamic stock and bond indices. We obtained the COVID-19-related keyword series from Google Trends, ADS business condition index values, S&P500 sharia stock values, and Islamic Bond index values from the DataStream database. The ADS business condition index is meant to be a proxy for real business conditions. It has seasonally adjusted economic indicators like initial jobless claims, industrial production, payroll employment, real personal income minus transfer income, quarterly real GDP, and real manufacturing and trade sales.

The intensity of Google search reflects the household's interest in events and markets. To avoid potential bias due to an increasing number of users, the series is categorized from 1–100 by dividing the total number of searches on all total keywords searched during the period (Adachi, Masuda, & Takeda, 2017; Khan et al., 2019). We make an investors' attention index by using Principle Component Analysis on the 23 keywords related to COVID-19 that Google trends for U.S. households suggests in the "related search query" section.

## 2.2 Empirical Approach (Wavelet Analysis)

### 2.1.1. Bivariate Wavelet Analysis

We employ different wavelet tools including bivariate and multivariate wavelet analysis. The technique of cross wavelet has the capability to initially decompose and then rearrange  $x(t)$  function (Rua & Nunes, 2009) as:

$$x(t) = \frac{1}{c_\psi} \int_0^\infty \left[ \int_{-0}^\infty w_x(u, s) \Psi_{u, s}(t) du \right] \frac{ds}{s^2}, s > 0 \quad (1)$$

Wavelet coherence is a useful method for calculating the coefficients of local correlation among series in a temporal frequency domain. Wavelet coherence is measured by the absolute smoothed cross wavelet value, which is standardized by the sum of each series' smoothed individual wavelet power spectrum:

$$R^2(u, s) = \frac{|S(s^{-1} W_{xy}(u, s))|^2}{S(s^{-1} |W_x(u, s)|^2 S(s^{-1} |W_y(u, s)|^2)} \quad (2)$$

Where,  $S$  represents the smoothing parameter; the  $R^2(u, s)$  is alike to coefficient of correlation which encounters the ensuing dissimilarity  $[0 \leq R] \leq 1$ . If the squared wavelet coherence value is close to zero, it means that the correlation between the two series is weak, while a value of one or close to one means that the correlation is perfect or strong (Torrence & Webster, 1999).

### 2.1.2. Multiple wavelet Analysis

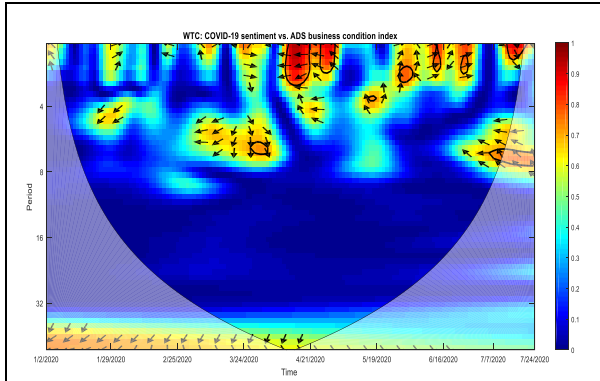
Next, we employ partial and multiple wavelet coherence (hereafter, PWC and MWC respectively) techniques. Both these techniques allow including control variables (see, Liu et al., 2007; Veleda et al., 2012). PWC analysis detects wavelet coherence between two time series after eradicating the power of a third time series. Mihanović et al. (2009) considers PWC similar to simple correlation that is mathematically given as:

$$RP^2(y, x_1, x_2) = \frac{|R(y, x_1) - R(y, x_2) \cdot R(y, x_1)^*|^2}{[1 - R(y, x_2)]^2 [1 - R(x_2, x_1)]^2}, \quad (3)$$

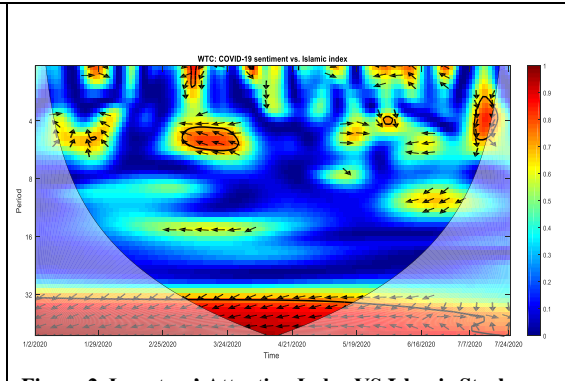
The MWC permits the inclusion of additional series as conditioning factor that is overlooked in bivariate wavelet methods. MWC also enables to analyze the joint effect of two series on the third one. MWC is like multiple correlations, and it looks at how the effects of multiple explanatory variables on an explained variable are:

$$RM^2(y, x_2, x_1) = \frac{R^2(y, x_1) + R^2(y, x_2) - 2R_e[R(y, x_1), R(y, x_2)] * R(x_1, x_2)^*}{(1 - R(x_1, x_2))} \quad (4)$$

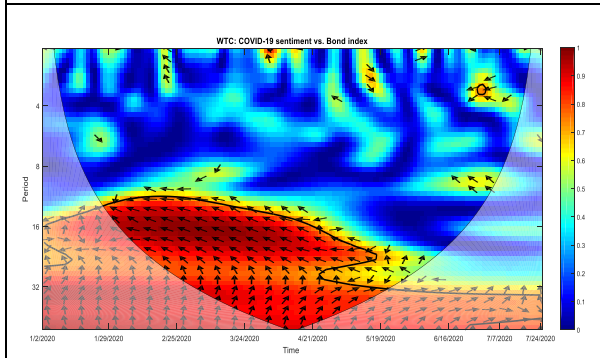
### 3. Results and Discussion



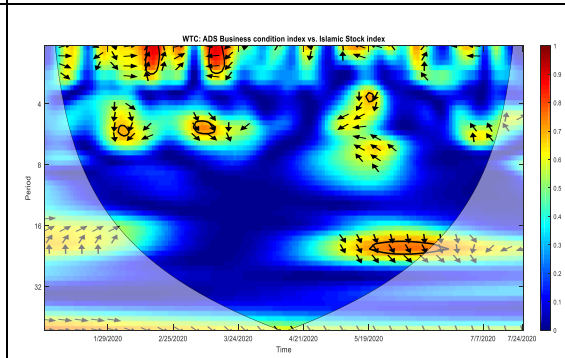
**Figure 1. Investors' Attention index VS ADS Business Condition Index**



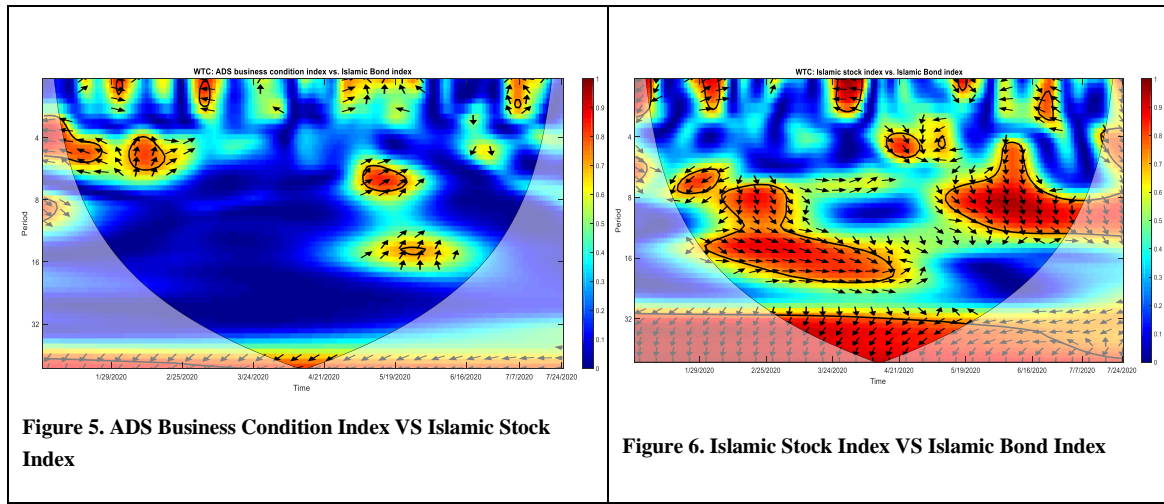
**Figure 2. Investors' Attention Index VS Islamic Stock Index**



**Figure 3. Investors' Attention Index VS Islamic Bond Index**



**Figure 4. ADS Business Condition Index VS Islamic Stock Index**



### 3.1 Wavelet Coherence

Figure 1 depicts continuous cross wavelet coherence between the investor attention index and the ADS index. It shows coherency in the short term (2-4 bands of scale), especially over two sub-periods (investment horizons). Strong coherency is more noticeable during the sub-period ranging from 4/21/2020 to the middle of May 2020, whereas small islands of orange color are scattered during the sub-period from 5/19/2020 to the end of the period. It suggests a mitigated lead-lag coherence between the two indices. Over the first sub-period, the two indices are in an anti-phase (negative relationship), indicating a bi-directional causal relationship where the ADS business condition index is the leading factor. It implies that if the business condition index is showing a lower value than average, household investors will pay more attention to the COVID-19 outbreak (epidemic conditions). Moreover, the lead-lag direction suggests that household investors focused more attention on the COVID-19 outbreaks when closely linked with the real business conditions of the economy. During the second sub-period, the COVID-19 attention index was conspicuously driving the real-time business index. After disrupting the real business conditions in the US market, household investors also realized the seriousness of COVID-19 outbreaks and responded accordingly. Our outcomes are in line with the Capacity Attention Theory of Kehneman (1973).

Figure 2 reports the coherency between the investors' attention index and the Islamic stock index for our sample period. It shows a relatively high coherency across various time horizons between the two variables. Moderate coherency from 0.7 to 0.8 is specifically viewed in the short run, corresponding to a 4 to 8 scale of band. The left and up-direction arrows (quadrant III) indicate that the Islamic stock index leads the investors' attention index in a negative

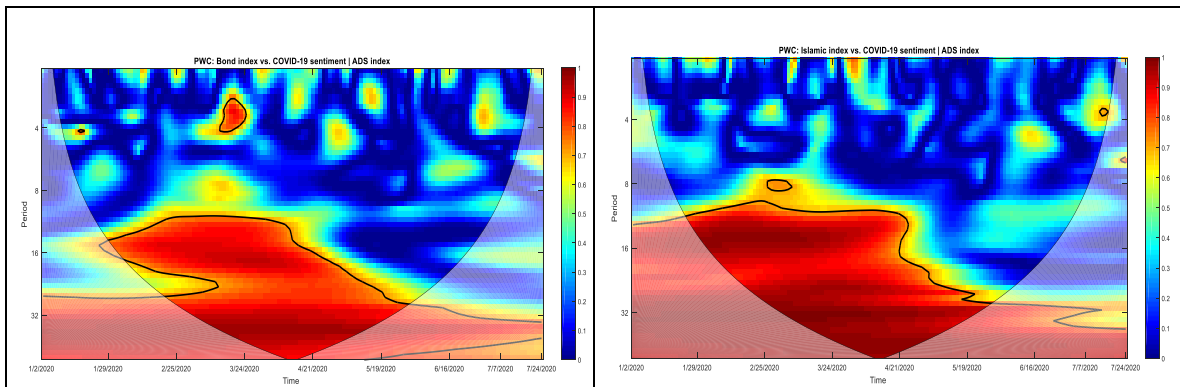
relationship. It implies that US households started focusing on the COVID-19 outbreaks, depicting a link with the Islamic stock market while, at the same time, the US businesses and stock markets were already disfigured. Remarkably, the relationship (in the long run) is reversed from the start of March 2020 to the middle of May 2020, when investors' attention leads the Islamic stock index in a negative relationship. This finding is in line with the Capacity Attention Theory, which states a situation attains more mental attention at the level of its severity. In contrast to the empirical literature, which shows that investor attention has a positive effect on stock returns (Bank, Larch, and Peter, 2011), our results point to a negative relationship.

Figure 3 depicts the wavelet coherence plot of the Investors' attention index and the Islamic Bond index. There is a non-coherency zone shown in the short and medium run, indicating no causality between the investors' attention index and the Islamic bond index. Looking at the left side and upwards arrows (quadrant III) in the long run frequency (16-32 band of scale), we find a negative relationship between the two indexes where the Islamic Bond index is the leading factor. It implies that if there is an increase in investors' attention index, co-movements decrease with the Islamic bond returns over the sub-period 1/29/2020–5/19/2020. The fear and uncertainty caused by the COVID-19 outbreak has a negative impact on investment decisions. Over the sub-period 3/24/2020-5/19/2020, the plot depicts a positive relationship where the investors' attention index is leading. It implies that the Islamic bond index, considered as a safe haven asset, is linked to the investors' attention index in the long run over our sample period. Since this is a positive relationship, it means that more investors will switch to the Islamic bond market when bad things happen or when things are uncertain.

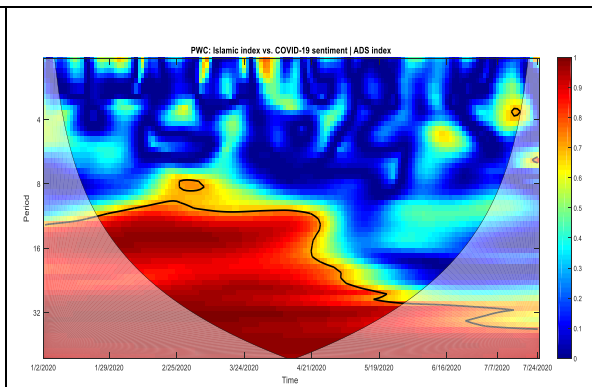
The ADS business condition index and the Islamic stock index co-movement are depicted in Figure 4. The coherency between these indexes, especially localized in the short run, is moderately significant over the sub-period 2/25/2020 to 3/24/2020. While the covariation changes from an in-phase (positive) to an anti-phase (negative) relationship over the same period, the ADS business condition index always leads the Islamic stock index. The ADS business condition index has a negative impact on Islamic stock returns. In the long run, it is clearly shown that the ADS business condition index and the Islamic stock index are in-phase (positive). Our findings are consistent with Razak et al. (2016), who observed that the Islamic stock market performs better during vulnerable economic conditions.

Figure 5 shows that the ADS business condition index leads the Islamic bond market index in the short run almost over the full sample period. However, the relationship between the indexes remains difficult to interpret, especially over the sub-period 1/29/2020 to 2/25/2020. Over this period, business activity tends to go up and down, implying swings in the ADS

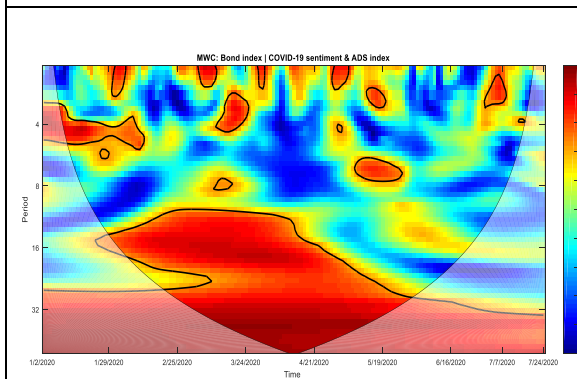
business condition index between leading and lagging the Islamic Bond index in the short run. Further, it also suggests a negative relationship during January and February months when US market conditions were stable as the COVID-19 outbreak was not yet in full swing. By the end of April, COVID-19 epidemic conditions will become more serious in the US and the ADS business condition index has a positive relationship with the Islamic bond market. Figure 6 shows the Islamic bond index leads the Islamic stock index over the medium-term as well as the short-term horizons, implying that investment in the Islamic bond index may be the optimal substitute for investors during eras of uncertainty and anxiety (flight-to-quality). In the long run, however, the Islamic stock index has a negative effect on the Islamic bond index. This is in line with what Park, Fang, and Ha (2019) found.



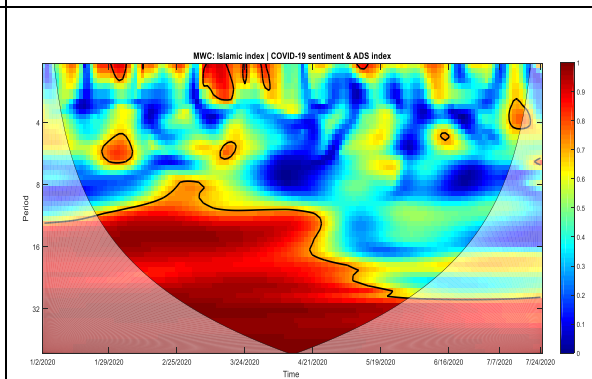
**Figure 7. PWC for Bond index vs. Investors' Attention index | ADS index**



**Figure 8. PWC for Islamic stock index vs. Investors' Attention index | ADS index**



**Figure 9. MWC for Bond index | Investors' Attention index & ADS index**



**Figure 10. MWC for Islamic stock index | Investors' Attention index & ADS index**

### 3.2 Multiple and Partial Wavelet outcomes

Figure 7 visualizes the partial wavelet coherency between the investors' attention index



and the Islamic Bond index, incorporating the ADS business condition index as a control variable. The highest level of coherency between the Islamic Bond index and investors' attention index is observed in the long term horizon from 1/29/2020 to 5/19/2020, whereas there is no coherency in the short-run over the sample period (except at the end of March 2020). It ranges from 0.7 to 0.8, indicating a strong relationship. With the ADS business condition index, the two indices have only a long-run correlation. One way to explain this is that there is a negative relationship between the ADS business condition index and the investors' attention index, which makes short-term correlation go away.

Figure 8 shows same for the Islamic stock index and the investors' attention index. These findings suggest that the investor attention index has more pronounced implications in long run, particularly when the majority of investors have homogenous beliefs directly linked with market uncertainty and complexity. It means that investors will put in more time and effort to understand the market situation when they are more worried about it.

We combine the effects of the investor attention index and the ADS index to show the Islamic Bond index movement over time and across scale bands in Figure 9. The joint effect of these variables on the Islamic Bond index is significant and is observed across all scale bands and over the sample period. In the short and medium term, small islands of orange color are scattered over the sample period, indicating the combined impact on movement of the Islamic Bond index. More interestingly, the joint effect on the Islamic Bond index is strongest over the long term (ranges from 0.9 to 1) and is exactly localized over the sub-period of 1/29/2020 to 5/19/2020. The combined synchronized effects for the Islamic stock index are depicted in Figure 10, which shows a similar pattern to those reported for the Islamic bond index in Figure 9 over the long run. However, the combined impact is less pronounced in short and medium-runs and especially localized over the sub-period from 1/29/2020 to 3/24/2020. It implies that during an epidemic outbreak, investors prefer passive strategies and respond to long-term return expectations. When epidemics directly or indirectly affect business conditions and in the end financial markets investors become more careful about their investments and pay more attention to them.

#### **4. Conclusion**

We examined the time-varying coherence of the investor attention index and the ADS index with Islamic stock and bond indices' returns from January 1, 2020, to July 27, 2020. Our empirical findings supported the capacity theory of attention as we reported higher investors' attention in the critical COVID-19 pandemic period from mid-March to mid-May 2020. Interestingly, the investors' attention is seconded by ADS business conditions, which intensify the household investors' anxiety about financial markets. It seems to say that

investors were worried about the financial markets because businesses were closing because of the government's COVID-19 lockdown policy.

Our findings also exhibit a negative coherence between Islamic stock returns and the investor attention index, in line with the information discovery theory of attention. Furthermore, we reported a positive long-term relationship between business conditions and Islamic stock returns, confirming the notion that Islamic stocks perform better in times of vulnerable business conditions. In line with the extant literature, our findings support the notion that Islamic bonds provide a safe haven for investors in times of uncertainty and anxiety, and we report that the ADS business conditions index leads the Islamic bond index in the long run. Our findings imply increased investors' attention towards business conditions and (Islamic) capital markets during the COVID-19 pandemic crisis. Based on what we've seen in the real world, policymakers and regulators should take steps and make policies to make it easier to get market information and make market shocks less complicated.

### **References**

- Adachi, Y., Masuda, M., & Takeda, F. (2017). Google search intensity and its relationship to the returns and liquidity of Japanese startup stocks. *Pacific-Basin Finance Journal*, 46, 243-257.
- Akarsu, S., & Süer, Ö. (2022). How investor attention affects stock returns? Some international evidence. *Borsa Istanbul Review*, 22(3), 616-626.
- Al-Khazali, O., Lean, H., and Samet, A. 2014. "Do Islamic Stock Indexes Outperform Conventional Stock Indexes? A Stochastic Dominance Approach", *Pacific-Basin Finance Journal*, 28, 29-46.
- AlNemer, H. A., Hkiri, B., & Khan, M. A. (2021). Time-Varying Nexus between Investor Sentiment and Cryptocurrency Market: New Insights from a Wavelet Coherence Framework. *Journal of Risk and Financial Management*, 14(6), 275.
- Andrei, D., & Hasler, M. (2014). Investor attention and stock market volatility. *Review of Financial Studies*, 28, 33–72.
- Aruoba, S.B., F.X. Diebold, and C. Scotti (2009), "Real Time Measurement of Business Conditions," *Journal of Business and Economic Statistics*, 27, 417–427.
- Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The unprecedented stock market reaction to COVID-19. *The Review of Asset Pricing Studies*, 1-17.
- Ballinari, D., Audrino, F., & Sigrist, F. (2022). When does attention matter? The effect of investor attention on stock market volatility around news releases. *International Review of Financial Analysis*, 82, 102185.

- Bank, M., Larch, M., & Peter, G. (2011). Google search volume and its influence on liquidity and returns of German stocks. *Financial markets and portfolio management*, 25(3), 239.
- Barber, B. M., & Odean, T. (2008). All the glitters: the effect of attention and news on the buying behaviour of individual and institutional investors. *Review of Financial Studies*, 21, 785–818.
- Brunnermeier, M., G. Gorton, and A. Krishnamurthy (2011), “Risk Topography,” NBER Macroeconomics Annual 2011, 26(1), 149–176.
- Chen, J., Tang, G., Yao, J., & Zhou, G. (2022). Investor attention and stock returns. *Journal of Financial and Quantitative Analysis*, 57(2), 455-484.
- Conlon, T., Corbet, S., & McGee, R. J. (2020). Are Cryptocurrencies a Safe Haven for Equity Markets? An International Perspective from the COVID-19 Pandemic. *Research in International Business and Finance*, 101248.
- Dong, D., Wu, K., Fang, J., Gozgor, G., & Yan, C. (2022). Investor attention factors and stock returns: Evidence from China. *Journal of International Financial Markets, Institutions and Money*, 77, 101499.
- Farooq, Moazzam, and Sajjad Zaheer. "Are Islamic banks more resilient during financial panics?." *Pacific Economic Review* 20, no. 1 (2015): 101-124.
- Hkiri, B., Hammoudeh, S., Aloui, C. and Shahbaz, M., 2018. The interconnections between US financial CDS spreads and control variables: New evidence using partial and multivariate wavelet coherences. *International Review of Economics & Finance*, 57, pp.237-257.
- Kahneman, D. (1973). *Attention and effort* (Vol. 1063). Citeseer.
- Khan, M. A., Ahmad, R., Azmi, A., & Akbar, M. (2019). A new sentiment index for the Islamic stock market. *Investment Analysts Journal*, 48(2), 146-172.
- Khan, M. A., Hernandez, J. A., & Shahzad, S. J. H. (2020). Time and frequency relationship between household investors’ sentiment index and US industry stock returns. *Finance Research Letters*, 36, 101318.
- Liu, Y., San Liang, X., & Weisberg, R. H. (2007). Rectification of the bias in the wavelet power spectrum. *Journal of Atmospheric and Oceanic Technology*, 24(12), 2093-2102.
- Mihanović, H., Orlić, M., & Pasarić, Z. (2009). Diurnal thermocline oscillations driven by tidal flow around an island in the Middle Adriatic. *Journal of Marine Systems*, 78, S157-S168.
- Odean, T. (1999). Do investors trade too much? *American Economic Review*, 89, 1279–1298.
- Park, K., Fang, Z., & Ha, Y. H. (2019). Stock and Bond returns correlation in Korea: Local versus global risk during crisis periods. *Journal of Asian Economics*, 65, 101136.
- Razak, A. R., Ismail, N., & Aridi, N. A. (2016). Is Islamic Stock Market no Different than Conventional Stock Market? An Evidence from Malaysia. *International Business*

- Management, 10(17), 3914-3920.
- Rua, A., & Nunes, L. C. (2009). International comovement of stock market returns: A wavelet analysis. *Journal of Empirical Finance*, 16(4), 632-639.
- Sharif, A., Aloui, C., & Yarovaya, L. (2020). COVID-19 pandemic, oil prices, stock market, geopolitical risk and policy uncertainty nexus in the US economy: Fresh evidence from the wavelet-based approach. *International Review of Financial Analysis*, 101496.
- Smales, L. A. (2020a). Investor Attention and Global Market Returns during the COVID-19 Crisis. Available at SSRN 3623915.
- Smales, L. A. (2020b). Investor Attention and the Response of US Stock Sectors to the COVID-19 Crisis. Available at SSRN 3625487.
- Sousa, R., Aguiar-Conraria, L., & Soares, M. J. (2014). Carbon financial markets: A time—frequency analysis of CO2 prices. *Physica A: Statistical Mechanics and Its Applications*, 414, 118–127.
- Tantaopas, P., Padungsaksawasdi, C., & Treepongkaruna, S. (2016). Attention effect via internet search intensity in Asia-Pacific stock markets. *Pacific-Basin Finance Journal*, 38, 107–124.
- Thorbecke, W. (2020). The Impact of the COVID-19 Pandemic on the US Economy: Evidence from the Stock Market.
- Torrence, C. and Compo, G.P., 1998. A practical guide to wavelet analysis. *Bulletin of the American Meteorological society*, 79(1), pp.61-78.
- Torrence, C., & Webster, P. J. (1999). Interdecadal changes in the ENSO–monsoon system. *Journal of Climate*, 12(8), 2679-2690.
- Uluceviz, E. and Yilmaz, K., 2018. Measuring real-financial connectedness in the US economy (No. 1812). Working Paper.
- Veleda, D., Montagne, R., & Araujo, M. (2012). Cross-wavelet bias corrected by normalizing scales. *Journal of Atmospheric and Oceanic Technology*, 29(9), 1401-1408.
- Vlastakis, N., & Markellos, R. N. (2012). Information demand and stock market volatility. *Journal of Banking & Finance*, 36, 1808–1821