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Understanding the Market Volatility during COVID-19 and Global Financial Crisis through ARCH/ GARCH Modelling of Conventional and Islamic Indices

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Abstract

This study investigated the volatility and predictability of Islamic and conventional stock indices during two significant crises; the COVID-19 pandemic and the 2007-08 financial crisis. Using ARCH/GARCH models, the study examined the volatility behaviour of both types of indices, while ARMA/ARIMA models are employed to disclose their predictability and autoregressive characteristics. The findings revealed that Islamic indices exhibited unique resilience to financial shocks. Specifically, Islamic indices showed reduced sensitivity to initial market disruptions in both crises, suggesting greater stability compared to conventional indices. However, both Islamic and conventional indices experienced sustained volatility in prolonged crises, highlighting the

need for robust risk management strategies. The study addressed a critical gap by examining how these crises affected the volatility of Islamic and conventional indices, identifying similarities and differences in their volatility patterns during periods of financial turmoil. The findings also highlight the stabilizing role of Islamic finance principles and offer important implications for investors, policymakers, and regulators in enhancing market resilience and designing effective crisis-response strategies.

Keywords: Market volatility, ARCH/GARCH Modelling, ARMA/ARIMA, financial crises, COVID-19, 2007-08 financial crisis, Islamic indices, conventional indices, financial econometrics, Islamic finance, asset pricing

1. Introduction

Black Swan incidents foster abrupt shock and distress among investors which give rise to instability (He, Liu, Wang, & Yu, 2020) and as a result negatively affect the performance of stock markets (Burch Douglas and Michael, 2016). Such as, Arab-Israel war 1973, Asian and global financial crisis 1997, 2008 and war against terror after the catastrophic incident of 9/11 badly influenced the stock markets across the globe (Karunanayake, Valadkhani, & O'brien, 2010). Moreover, empirical evidence also discloses significant harmful effects of pandemics like Severe Acute Respiratory Syndrome (SARS) and Ebola Virus Disease (EVD) on the stock markets (Hsieh, 2013 and Ichev and Marinˇc, 2018). The eruption of COVID-19 is also considered as a Black Swan incident as it has also induced unrest among investors and poses detrimental effects on financial markets (Matkovskyy, and Jalan, 2020).

Multiple global issues emerged at globe that affected the economic and social areas during the 21st century like; Global Financial Crisis 2007-08 and the Pandemic of CIVID 19. While started as health disaster, COVID-19 epidemic abruptly evolved into global economic downturn (Goodell, 2020). During this pandemic, far-reaching economic impacts, leading to rapid and extreme fluctuations in financial markets observed worldwide. Furthermore, U.S and global financial market circuit breakers witnessed 4 periods of highest volatility in March 2020 (Contessi & De Pace, 2021). In order to deal with this uncertain economic shock almost all the developing and developed economies of the world started execution of imperative fiscal and monetary measures comprising obligatory lockdowns and social isolation programs (Baig et al., 2021). Whereas,

Global financial markets have historically shown increased volatility in times of crisis, as witnessed during the 2007–08 financial crisis and the COVID-19 pandemic (shear & Ashraf, 2022). The 2007–08 crises, triggered by a collapse in the U.S housing market and subsequent failures in major financial institutions, led to severe disruptions across global markets, highlighting vulnerabilities in conventional finance (Hasan et al., 2021).

In both cases, conventional financial systems experienced severe instability, but the effects on Islamic finance, with its unique principles prohibiting excessive risk-taking and interest-based transactions, remain relatively underexplored (Erdogan et al., 2020). Empirical analysis of market Volatility, described as a degree of dispersion in trading prices over time, is significant for both literature and investors. Hypothetical investing and undue skepticism is prohibited in Islamic finance. (Gira et al, 2016). Moreover, the utmost distrust following the pandemic has brought about scholars to examine the impact of COVID 19 on various asset earnings, risk limitations and the whole economy (Anh and Gan, 2020; Angosto-Ferandez-Serrano, 2022). Daily data of 8 years supported the notion that shocking news affected the volatility of both conventional and Islamic stock markets. (Almanaour, 2022). Besides, Spillover effects of COVID-19 pandemic are different from various other epidemics and Great Depression because implication of traditional economic tools failed to resist its devastated effects (Contessi & De Pace, 2021).

During the past few years a rapid growth has been witnessed in the Islamic finance. The value of Islamic financial markets has an approximate amount of 5 trillion USD. (Standard Chartered, 2025). Whereas, financial analysts have forecasted the further growth, up to 4.94 trillion USD until 2025. Meanwhile, Recent Islamic Financial Services Board report reveals that Sharia finances climbed to $4.00 trillion in 2021 and is forecasted to peak at $5.90 trillion till 2026. It is pertinent to note that in recent times Sharia finances has drawn attention of Non-Muslim equity holders and has emerged as an effective option for risk aversion. In spite of the increasing share of Islamic Indices funds , high risk immune ability towards world financial Crisis 2008 also played an important role in the growth of Islamic investment funds.

Simultaneously, in the course of economic shock Islamic indices performed well as compare to its counterpart and attained the attention of policy makers. Existing empirical analysis assimilating conventional and Islamic finances has provided mixed outcomes. Various researches discovered

no meaningful distinction between the performances of these two varieties of Indices after regulating certain elements. (Girard et al, 2008). Nevertheless, findings of various other studies revealed that Islamic Indices surpassed conventional Indices during 2007-08 world financial Crisis and post crunch span of 2013-17, especially in the region of Asia Pacific and European economies. (Asutay et al. , 2021). Throughout the period of market slumps, Islamic financial markets have exhibited better execution and relocated towards efficiency. Meanwhile, it took a long time for conventional markets to achieve efficiency. (Al-Khazali et al. , 2016). On the other hand, study of (Ahmad & Badri , 2021) found the superior Islamic Indices over conventional across various economies. Traditionally, Islamic finance, with its unique principles prohibiting excessive risk-taking and interest-based transactions, remain relatively stable and show less variation during the period of predicament. Therefore, by investigating pairs alike the Morgon Stanley Equity Index (MSEI), the research will underscore if Sharia based financial structure played a part to lessen the severity of volatility in the course of market turmoil. Moreover, results of this study will also disclose the ascendency of resilience of both indices in making practical decisions to minimize the risk and safe return.

Regardless the significance of examining financial robustness, only a few studies incorporated the volatile response of Sharia and traditional indices in the course of global crisis, specifically in a comparative reasoning. The emergence of 2007-08 financial crises and epidemic of COVID-19 created uncertainty that in turn set off volatility, but the unique foundations of Islamic indices enabled it to give sophisticated response; less instability. Henceforth, the current research carries off this research gap by analyzing efficiency of both alternative markets amidst these catastrophes by using data of daily closing prices from January 2020 to December 2021. And is designed to address following questions

- How did the 2007–08 financial crises and the COVID-19 pandemic affect the volatility of conventional and Islamic financial indices?
- What are the similarities and differences in the volatility patterns of conventional and Islamic indices across these crises?
- How effectively do ARCH/GARCH models capture and analyze the volatility dynamics of these indices during periods of crisis?

2. Literature Review

Existing literature provides two key assertions in relation to uncertainty and return-risk balance between traditional and Islamic indices; decoupling and contagion frameworks. These principles are helpful in seeking the answers of subsequent question; are Sharia indices "crisis- resistant assets and administer diversified profits to traditional investors?

For instance Erdogan et al. (2020) empirically examined the response of conventional and Islamic stock markets during COVID-19 in Turkey. The Study utilized GRACH method to analyze the effect of COVID-19 pandemic on both traditional and Islamic Indices. Results of the study indicate that the Islamic stock market performed better during COVID-19 in Turkey. A very similar kind of research was done by (Hasan et al., 2021), assessed the impact of COVID-19 on the performance of Islamic and conventional indices. After employing the multi-time series technique, study found that pandemic generated alike volatility in both stock markets. Investing in Islamic equity is a rational choice for those who want to minimize the risk over the period of crisis (Shahzad and Naifar (2022), luring the substantial share of global portfolio diversification (Bossman, 2021) making these stocks as a better option for investment as compare to its counterpart; (Ng et al., 2020).

In addition Almansour (2021) studied the volatility of Dow Jones Conventional and Islamic Indices before, during, and after COVID-19 outbreak. The findings show that the GARCH, TGARCH, and EGARCH models were the most effective in forecasting the Dow Jones indices. The results further show that the conventional indices had worse performance than the Islamic indices. Moreover, in a similar study Elshqirat, (2021) investigated the performance of Islamic and conventional indices in the gulf cooperation council (GCC) countries before and during COVID-19. After employing the CAPM model the study concluded that pandemic has affected the performance of both Islamic and conventional indices equally, indicating Islamic indices do not present a diversification during COVID-19. Besides, a comparable type of research has been undertaken by Saleem et al., (2021) to explore the volatility of Islamic indices before and during COVID-19 for nine Islamic indices across the world . Estimates of GARCH methodology reveal that in the first 15 days of the pandemic, the Australian Islamic indices and GCC Islamic indices

persisted stable but in the short term, the Islamic stock indexes of Qatar, UAE, ASEAN, MENA, MENASA, and Bahrain experienced meaningful effects due to the outbreak of pandemic.

Similarly, Viphindrartin et al. (2022) empirically compared the performance of Islamic and conventional indices' before and during the COVID-19 pandemic in Indonesia. This Study used autoregressive method to estimate the model. Findings of the study show that Islamic indices were more stable than conventional indices. In the same way, Huda et al., (2022), found that the paired sample T-test results also suggest that COVID-19 pandemic has increased the average return and decreased the risk of all Sharia indices analyzed during pandemic period. Halisa & Annisa (2022) investigated the effect of macroeconomic variables; inflation, export, imports and exchange reserves during COVID-19 pandemic on the Islamic and conventional indices. Findings of multivariate multiple linear regression method reveal that exports and exchange reserves have a positive effect on the Islamic indices but inflation and imports have not any significant effect on the Islamic indices.

Likewise, a seminal contribution was made by Ahmid & Agirman, (2023) providing empirical evidence that the COVID-19 pandemic affected both Islamic and conventional indices. The study used ARIMA and EGARCH methods to estimate the model. Results obtained from these methodologies proclaim that Islamic indices better played during the period of COVID-19. Alike, Alamgir & Cheng, (2023) executed an investigation to analyze the co-movement and performance of conventional versus Islamic indices during the pre and post-COVID-19. The wavelet method applied to check the performance, co-movement, and volatility of the conventional and Islamic indices in selected developing and developed economies of the world. The results of the wavelet method, disclose that the Islamic indices better performed during the COVID-19 period.

Smith (2006), in his study found that the outbreak of pandemics and occurrence of financial crisis adversely impact investors' perceptions and stock market performance. Bad sentiments like agitation and desperation are positively associated with exigency, which may bring out risk perception among investors. As a result, investors cast around propitious and desperate strategy during bearish and bullish trends in the stock indices accordingly. While, optimistic response has also witnessed against the exogenous aspects including epidemics. (Lee and Mckibbin 2004 and Liu 2020). Moreover, various empirical evidences reveal that news associated to pandemics has

meaningful influence on the decision making ability of investors. For example, empirical results of Donadelli et. al, (2017) study indicated that epidemic news broadcasted by World Health Organization (WHO) had an inevitable influence on investors' perceptions, which in turn effect financial market performance. (Wang et. al 2013)

The "efficient market hypothesis" introduced by Fama et. al (1969) also demonstrated that shared private and public announcements regarding any uncertain situation imitated in the appraisal of stock indexes. Empirical literature supports the practical implication of this hypothesis by confirming negative effect of COVID-19 on the market profits. Specifically, findings of A-Awadhi et al (2020) research showed an anomalous negative payback throughout the era on the 21 stock exchanges of effected economies. In a similar work, Ashraf (2020) also found an adverse impact on the stock market performance as a result of announcements concerning an increase in COVID-19 patients. Besides, results of Phan and Narayan (2020) study disclosed similar detrimental response in selected 25 nations.

The term market volatility can be expressed as a situation when a market faces uncertain upward and downward trends in stock indices (Bhowmik and Way, 2020). The prevalence of adverse circumstances such as pandemics at global level knocks back financial market activities (Chowdery et al 2021). Various studies in recent times focused stock market volatility due to worldwide epidemic catastrophe. For example, by utilizing ARCH methodology, Onali (2020) investigated the effect of COVID-19 outbreak on the volatility of Dow Jones stock indices and S & P 500. Findings of her study revealed that COVID-19 has meaningfully altered the volatility of these markets and its effects lasts for a long period of time. Baker et al. (2020) also experienced same result for the US stock markets.

Moreover, catastrophic events of registered causalities, number of diagnosed patients and quarantine during the pandemic asserted negative effect on the performance of stock markets in the USA (Baig et. al, 2021). Same adverse effect of lockdowns, deaths and number of affected is witnessed in the results of Akhtaruzzaman et. al, (2021) study conducted to examine the market performance of G7 nations. Significance of good or bad news regarding the outbreak of any pandemic was more damaging to financial markets as compare to their counterparts. Financial markets in Asian region also observed higher risk and steadfast volatility over the period of

COVID-19 epidemic (Sharma, 2020). Likewise, Indian stock indices experienced similar outcome (Bora and Basistha, 2020). Dharani et. al, (2022) analyzed the volatility and resistance of Islamic and Nom-Islamic indices from S & P 12100 over the span of 2010 to 2020. Findings of the study show that Islamic indexes were relatively less volatile and therefore, remained less risky with higher profits during the uncertainty of COVID-19 analogous to conventional markets.

3. Econometric Specification

Various measures are available in econometric literature to examine the financial volatility. But in advanced econometric theory ARCH and GARCH techniques provide a valid and sophisticated solution to analyze market volatility, especially in the course of the uncertain scenarios of economic upheaval and outbreak of epidemics. Because these are substantially devised to highlight the time variant instability, permitting scholars to examine how fluctuations occurred in the past effect current market sentiments. Therefore, these methodologies are utilized for both conventional and Sharia finances to obtain correct patterns of variations. Henceforth, the study will use diurnal closing prices of Dow Jones Islamic market indexes (DJIMI) and Dow Jones Composite Index (DGCI) inter alia for two consecutive years from January 2020 to December 2021 to analyze the degree and patterns of volatility during epidemic and financial distress. Moreover, these methodologies are specifically selected to evaluate volatility and reveal conceivable parameters instability amid predicament. In order to comprehend the behavior of various financial networks' response against capricious global economic pandemics, the study encompasses market of various regions, like Hong Kong Seng Index (HKSI) & Hong Kong Islamic Index (HKII)

3.1. ARCH and GARCH Methodologies

Simple econometric equations of ARCH/ GARCH will be of the form

$$y_t = \mu + \epsilon_t$$

y_t = Daily yields of an index at time "t"

μ = Constant mean (expected value)

ε_t = Residual (accomplishing random transformation)

Meanwhile, in financial contexts, ϵ_t encapsulates short-term shocks or volatility in returns around the overall trend, making it useful in modeling time series where randomness or volatility is present. The equation

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i \, \epsilon_{t-i}^2 + \sum_{j=1}^{p} \beta_j \, \sigma_{t-j}^2$$

Represents the conditional variance in a GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model of order (p, q). Furthermore, it discloses the fact that variance in current period based not only on the square of previous period error term but also on previous period variance, while, parameters show the intensity of change. Henceforth, today's volatility depends also on past volatility.

ARMA/ARIMA equation:

$$y_t = \mu + \sum_{i=1}^{p} \phi_i \, y_{t-i} + \sum_{j=1}^{q} \theta_j \, \epsilon_{t-j} + \epsilon_t$$

The equation represents an ARMA/ARIMA model, where y_t is the current value of the time series, μ is a constant mean, and ϵ_t is a random error term. As above equation pooled autoregressive (indicated by $\emptyset y_{t-i}$) and moving average ($\theta \epsilon_{t-j}$) hence making ARIMA an appropriate technique of forecasting in case of time series analysis, especially for the sectors characterized by high risk and volatility

3.2. Sources of Data

There are various data origins available to provide data for empirical analysis but the study considers Data Stream. The advantage of this data source over the other available datasets is that it provides comprehensive historical data on financial and economic sectors. Therefore, regarded as a best option for robust analysis and correct results. For estimation and to compare the strength and performance of Sharia and Conventional indices, the study selected day to day closing price of various indices mentioned in table 1

Table 1: Traditional and Islamic Index

Country	Traditional Indices	Islamic Indices
United state	Dow Jones Composite Index (DJCI)	Dow Jones Islamic Market Index (DJIMI)
United state	Standard & poor 500 index (S&P)	Standard & Poor Shari'ah Index (S&PSI)
United Kingdom	Financial Time Index (FTSE)	Financial Times Islamic Index (FTSEII)
Malaysia	FTSE Bursa Malaysia Kuala Lumpur Composite Index (KLCI)	FTSE Bursa Malaysia Hijrah Shari'ah Index (KLSI)
Indonesia	Jakarta Composite Index (JCI)	Jakarta Islamic Index (JII)

4. Results and Discussion

4.1. Descriptive Statistics Analysis

Table 2 summarizes descriptive statistics analysis for various Islamic and conventional indices during both the COVID-19 pandemic and the 2007-08 financial crisis. Each index includes the number of observations (Obs), mean returns, standard deviation (Std. Dev.), minimum (Min), and maximum (Max) values, providing insights into the performance and volatility of these indices across different crisis periods.

When we compare the standard deviation (S.D) of both conventional and Islamic indices, it becomes evident that both finances exhibit higher values over the period of COVID-19 pandemic. Hence show that both indexes faces high volatility over this catastrophic event. For instance, standard deviation of Dow Jones traditional stocks (RDJC) is highest among all other selected indices i.e. 2.712, following Financial Times Islamic Index (FTSEII) with S.D of 2.598. Both these indices higher S.D indicates that COVID-19 pandemic equally affected the performance of both markets in terms of high volatility.

While on the other hand all the stocks either conventional or Islamic show lower Standard Deviation during the global financial crisis 2007-08. Over the period of this crisis United

Kingdoms' Financial Times Islamic Index (FTSEII) faces higher volatility with the S.D 2.703, whereas, RSPI stocks witnessed 2.018 S.D and remains second in volatility. Meanwhile, throughout both uncertain circumstances FTSE Bursa Malaysia Kuala Lumpur Composite Index (KLCI) and FTSE Bursa Malaysia Hijrah Shari'ah Index (KLSI) reveals stability with S.D 1.314 and 1.339. Correlation analysis of paired indices shows a mixed tendency of volatility. As far as, the risk and gain assessment is concerned, RKLSI observed higher risk because of the higher minimum value -16.663 and lower maximum value 6.123. on the other hand, RFTSEI has shown lower risk during these circumstances with minimum and maximum value -12.534 and 18.398 respectively. Moreover, mean value of all the indices suggests a minor returns amid COVID-19 epidemic and financial crisis 2007-08.

Table 2: Descriptive Statistic Analysis

Full Sample					
Variable	**Obs.**	**Mean**	**Std. Dev.**	**Min**	**Max**
RDJC	949	-0.002	1.934	-12.273	11.434
RKLC	949	0.024	1.111	-9.497	6.851
RFTSE	949	-0.018	1.722	-10.491	9.211
RSP	949	-0.003	1.987	-11.984	11.58
RJAK	870	0.034	1.909	-10.375	10.191
RDJIMI	949	0.018	1.58	-9.189	10.269
RKLSI	949	0.045	1.335	-16.663	6.123
RJAKI	949	0.034	2.106	-12.94	12.812
RFTSEI	559	0.029	2.67	-12.534	18.398
RSPI	624	0.018	2.167	-12.12	12.28
During Covid-19					
RDJC	165	0.002	2.712	-12.273	11.434
RKLC	165	0.021	1.282	-5.261	6.851
RFTSE	165	-0.075	2.046	-10.491	8.861
RSP	165	0.048	2.543	-11.984	9.383
RDJIMI	165	0.083	1.999	-9.189	8.238
RKLSI	165	0.109	1.314	-4.897	6.123
RJAKI	165	-0.085	2.242	-7.841	12.812
RJAK	143	-0.114	1.942	-6.579	10.191
RFTSEI	165	0.04	2.598	-12.534	8.796

RSPI	165	0.084	2.544	-12.12	9.697
During Global Financial Crisis 2007-08					
RDJC	784	-0.003	1.729	-8.328	10.616
RKLC	784	0.025	1.073	-9.497	4.351
RFTSE	784	-0.006	1.646	-8.341	9.211
RSP	784	-0.014	1.851	-9.035	11.58
RDJIMI	784	0.005	1.477	-7.859	10.269
RKLSI	784	0.031	1.339	-16.663	4.641
RJAKI	784	0.059	2.076	-12.94	8.18
RJAK	727	0.062	1.903	-10.375	7.921
RFTSEI	394	0.024	2.703	-9.186	18.398
RSPI	459	-0.005	2.018	-9.091	12.28

4.2. Correlation Matrix

Table 3 presents the correlation analysis of selected indices. This correlation matrix provides the relationships between various conventional and Islamic indices, showcasing the degree to which these indices moved together during the study period. Notably, certain indices exhibit strong positive correlations, indicating that they tend to move in the same direction. For example, RDJC and RSP display a high correlation (0.974), suggesting that these indices were closely aligned in their responses to market shifts, likely due to similar underlying factors or market influences. Similarly, RDJIMI and RSP also show a strong positive correlation (0.87), which implies that these indices tend to follow similar patterns, potentially because of overlapping market exposures or investor behaviors. Moderate correlations, like those between RFTSE and RKLC (0.361) and RDJIMI and RFTSE (0.769), suggest a weaker but still positive relationship, where these indices may be influenced by some common factors but with some level of independence.

Table 3: Correlation Analysis

Variables	**RDJC**	**RFTSE**	**RKLC**	**RSP**	**RJAK**	**RDJIMI**	**RKLSI**	**RJAKI**	**RFTSEI**	**RSPI**
RDJC	1									
RFTSE	0.504	1								
RKLC	0.088	0.361	1							
RSP	0.974	0.529	0.08	1						
RJAK	0.045	-0.01	-0.062	0.05	1					

RDJIMI	0.844	0.769	0.307	0.87	0.036	1				
RKLSI	0.092	0.282	0.815	0.084	-0.03	0.266	1			
RJAKI	0.14	0.352	0.55	0.129	-0.017	0.346	0.462	1		
RFTSEI	0.031	0.097	0.103	0.02	-0.045	0.078	0.083	0.065	1	
RSPI	0.032	0.056	-0.033	0.024	0.031	0.016	-0.015	-0.053	-0.005	1

On the other hand, several indices show little to no correlation, highlighting their relative independence from one another. For instance, RSPI has very low correlations with other indices, such as 0.056 with RFTSE and -0.033 with RKLC, indicating that RSPI's movements are largely disconnected from other market trends. This lack of correlation may reflect unique market characteristics or investor bases specific to RSPI. Additionally, RJAK and RKLC exhibit a slight negative correlation (-0.062), suggesting a small tendency to move in opposite directions. These low and negative correlations suggest that certain indices may provide diversification benefits, as they do not move in tandem with more volatile indices. This initial analysis of correlation patterns underscores that while some indices exhibit strong interdependencies, others are less affected by shared market influences, which could imply varying levels of resilience across conventional and Islamic indices during periods of market stress. Further analysis through ARCH/GARCH modeling will help quantify and understand these volatility dynamics more comprehensively.

4.3. Findings and Interpretation of ARCH/GARCH

Empirical findings of ARCH/GARCH methodologies, presented in the table 4, comprehensively explore which indices is highly volatile i.e Sharia or Traditional. These results basically measure the volatility clustering in both indexes. On one side, ARCH estimates tell us about the sudden response to volatility, while on the other hand, GARCH results evaluates the strength of resilience against unprecedented upheavals. Various indices either Conventional or Islamic revealed a high level of pliability during the predicament of COVID-19. Such as RDJMI (an Islamic financial market) showed a significant value of 0.718, inferring sudden shocks to volatility is decisive but the value of GARCH is 0.2084 (p=0.03) which explains a temperate resilience against volatility time and a half. Meanwhile, the conventional index RDJC (Dow Jones Conventional Index) has

an even higher ARCH coefficient of 1.007, reflecting a strong response to immediate shocks, and a GARCH coefficient of 0.189, indicating a lower but significant persistence.

The high ARCH coefficients for both Islamic and conventional indices suggest that volatility during COVID-19 was more reactive to sudden market shocks. However, GARCH coefficients are generally lower than during the 2007-08 crises, suggesting that while volatility was high, it was somewhat less persistent over time.

During 2007-08 financial crises, both Islamic and conventional indices exhibit lower ARCH coefficients but higher GARCH coefficients compared to the COVID-19 period. For instance, RDJMI has an ARCH coefficient of 0.249 (lower than during COVID-19) and a GARCH coefficient of 0.76, indicating that while immediate volatility reactions were more muted, the persistence of volatility was higher. This trend is consistent across indices, as seen with RDJC, where the ARCH coefficient is 0.206 and the GARCH coefficient is 0.943, reflecting high volatility persistence. This suggests that during the financial crisis, volatility shocks were less extreme but tended to linger longer in the market. This is a marked difference from COVID-19, where volatility was more reactive but less persistent, potentially reflecting different underlying market dynamics in each crisis.

4.4. Results of ARMA/ARIMA

The study utilized ARMA/ARIMA techniques to understand the fundamental pattern in the gains of traditional and Islamic finances as a result of unprecedented dilemma (COVID-19 pandemic and the 2007-08 financial crisis) amid elevated volatility. Empirical findings of these methodologies are provided in the table 5 Estimated value of AR (1) is meaningful for various indices ranging from +ve (0.082) for RKLC to –ve (-0.590) for RDJC confirming that previous period values specifically influenced current estimates. Similarly, a meaningful tendency of previously occurred dismay effect on the current market performance at decreasing rate over time is witnessed for the RJDC index with -0.590 value , jointly with a significant MA (1) estimate of 0.295. Moreover, indexes such as RFTSE & RJAK show a stout autoregressive and MA with value of approximate to ± 1, confirming a strong endurance of stabilization amidst high volatility.

Meanwhile, various other indices such as, RFTSE and RJAK reveal heterogeneous results and used more than one i.e. AR2 and MR2 terms. Alluding that past value of two consecutive periods influence the current estimate. For instance, AR2 estimated value of RJAK index is 0.0878 and -0.847 for MA2 expressing both positive autoregressive effect and an inverse M.A. Inclusively, these methodologies emphasize distinct notches of endurance in conventional and Sharia indices over the course of distress situations, that can effect forecasting precision and model reliability.

Table 5: Estimates of ARMA/ARIM

During Covid-19								
Variable	**AR**	**coefficient**	**SE**	**PV**	**MA**	**coefficient**	**SE**	**PV**
RDJC	AR(1)	-0.590	0.105	0.000	MA(1)	0.295	0.118	0.014
RKLC	AR(1)	0.282	0.047	0.000	MA(1)	-0.321	0.045	0.000
RFTSE	AR(1)	-0.864	0.060	0.000	MA(1)	0.975	0.046	0.000
RJAK	AR(1)	0.569	0.162	0.001	MA(1)	0.752	0.135	0.000
RSP	AR(1)	0.697	0.232	0.003	MA(2)	-0.620	0.247	0.013
RDJIMI	AR(1)	-0.224	0.051	0.000	MA(2)	0.268	0.249	0.000
RKLSI	AR(1)	0.014	0.050	0.774	MA(3)	0.061	0.071	0.390
RJAKI	AR(1)	-0.610	0.112	0.000	MA(1)	0.820	0.087	0.000
RFTSEI	AR(1)	-0.185	0.064	0.004	MA(3)	0.221	0.043	0.000
RSPI	AR(1)	-0.358	0.048	0.000	MA(2)	0.208	0.051	0.000
During crisis 2007-08								
RDJC	AR(1)	0.239	0.140	0.089	MA(1)	-0.384	0.127	0.002
RKLC	AR(2)	-0.001	0.024	0.950	MA(1)	0.119	0.022	0.000
RFTSE	AR(2)	-0.089	0.022	0.000	MA(3)	-0.134	0.021	0.000
RJAK	AR(2)	0.878	0.136	0.000	MA(2)	-0.847	0.147	0.000
RSP	AR(3)	0.061	0.024	0.013	MA(1)	0.172	0.023	0.000
RDJIMI	AR(2)	-0.126	0.018	0.000	MA(1)	0.106	0.023	0.000
RKLSI	AR(2)	-0.709	0.375	0.058	MA(2)	0.675	0.392	0.087
RJAKI	AR(1)	-0.021	0.048	0.659	MA(2)	-0.225	0.041	0.000
RFTSEI	AR(4)	0.221	0.140	0.116	MA(3)	-0.428	0.120	0.000
RSPI	AR(1)	0.110	0.028	0.000	MA(1)	0.032	0.023	0.171

4.5. Comparative Analysis

Comparison of distinct traditional and Sharia indices is the ultimate goal of this study. Because a meaningful comparison of both parallel stock markets performance during the times of crises will be helpful for equity holders to make more rational investment decisions. As far as COVID-19 pandemic effect is concerned, it triggered abrupt and severe disruptions across global markets, as shown by high ARCH and GARCH coefficients in both Islamic and conventional indices. For Islamic indices, such as RDJIMI and RSPI, the ARCH coefficients were significant but generally lower than the GARCH coefficients, indicating that while these indices responded to immediate shocks, their volatility was more prolonged rather than spiking suddenly. For instance, the RFTSEI index displayed a high GARCH coefficient of 0.815, suggesting that once volatility appeared, it remained steady over time, pointing to a sustained reaction to COVID-19-induced market conditions. In contrast, conventional indices such as RDJC and RSP had higher ARCH coefficients, indicating a more pronounced immediate response to the pandemic's impact. These indices experienced sharper spikes in volatility, and their high GARCH coefficients, like the 0.575 for RJAK, imply that these initial shocks were followed by extended periods of uncertainty and lingering volatility throughout the COVID-19 period. The difference in ARCH coefficients suggests that Islamic indices might be somewhat insulated from extreme initial shocks due to their emphasis on risk-sharing and asset-backed principles. However, the high GARCH coefficients across both index types indicate that once volatility was introduced, it persisted during the COVID-19 period.

Conversely, the 2007-08 financial crises led to prolonged volatility in both Islamic and conventional indices, evidenced by high GARCH coefficients. However, the initial responses differed, as shown by the varied ARCH coefficients. Islamic indices, such as RDJIMI and RFTSEI, exhibited lower ARCH values compared to conventional indices, suggesting a milder initial reaction to the crisis. This could be due to their limited exposure to speculative activities, which were highly implicated in the crisis. Despite the lower ARCH coefficients, the GARCH coefficients remained significant (e.g., 0.76 for RDJIMI and 0.844 for RFTSEI), highlighting that once volatility set in, it was sustained over time. In contrast, conventional indices showed high ARCH coefficients, reflecting a stronger sensitivity to initial shocks, likely due to exposure to leveraged financial products affected by the crisis. For instance, RDJC and RSP displayed

significant ARCH coefficients, indicative of a heightened reaction to the initial market collapse. High GARCH coefficients in these indices also suggest prolonged volatility, as the systemic nature of the crisis led to extended market uncertainty. Overall, these findings imply that during the 2007-08 crises, Islamic indices may have been less volatile initially due to the absence of speculative, interest-based products. However, both types of indices eventually experienced prolonged volatility, as indicated by the GARCH terms, once the crisis took hold.

Alternatively, findings of ARMA/ARIMA estimates during high risk circumstances of pandemics are helpful in forecasting the responses of both Islamic and conventional indices. Results support a strong relationship between the current and future values, attaining the sudden effect of catastrophes on the performance of markets. As far as Islamic indices are concerned, a meaningful AR value reveals a sophisticated harmonization to fluctuating market circumstances. In this regard RSPI and RFTSEI indices forecasted future trends underscoring current situations. Meanwhile, the Moving Average value of these indices is less significant indicating less sensibility in the short run. On the other hand, high correlation and mean reversion trends are found conventional markets that exhibits a higher degree of forecasting in the AR(1) and MA(1) elements. This phenomenon reflects an instant effect of pandemic on the performance of indices in later vintages.

This study is significant in analysing the key attributes of conventional and Islamic indices during crisis. The estimates of the study are helpful in comparing the response and recovery patterns of both markets during the crisis of COVID-19 pandemic and global financial crisis. As far as resilience is concerned, low ARCH estimates indicate that Islamic index is less affected by the sudden shocks. The reason behind this strong resistance against these socks is Sharia principles that allow investors to avoid high speculation and invest in the lower risk oriented plans. Meanwhile, larger GARCH estimates show that once volatility overcomes the resilience, Islamic indices will also follow the same long lasting volatility patterns like its counterparts. This phenomenon reveals that instead of showing initial stability Islamic indices cannot completely overcome the long run effects of market shocks.

5. Conclusion and Policy Recommendations

5.1. Conclusion

Global financial markets have historically shown increased volatility in times of crisis, as witnessed during the 2007–08 financial crises and the COVID-19 pandemic. In both cases, conventional financial systems experienced severe instability, but the effects on Islamic finance, with its unique principles prohibiting excessive risk-taking and interest-based transactions, remain relatively underexplored. Considering the importance of financial robustness during times of crisis, it is essential to incorporate the volatile response of Islamic and conventional markets during global shocks, especially in comparative argumentation. Henceforth, current research carries off efficiency analysis of both alternative markets amidst the catastrophes of COVID-19 and Global Financial Crisis 2007-08 by using data of daily closing prices from January 2020 to December 2021.

The study focused on the initial response against the abrupt crisis and long term impacts of resulting volatility. Moreover, a comparison is made to understand the initial strength of recovery between Islamic and traditional indices. Initial resilience of Sharia indices against abrupt circumstances is more powerful as compare to its counterpart traditional finances. Therefore this significant preliminary resistance against uncertainty can provide investors of Islamic indices more confidence in times of crisis relative to conventional equity holders. While, both types of indices exhibited complex autoregressive structures in the 2007-08 financial crises, suggesting that prolonged crises can affect predictability.

The differences in how indices responded to the COVID-19 pandemic versus the 2007-08 financial crisis reveal that Islamic indices are particularly resilient to crises originating from speculative or debt-based factors (such as the 2007-08 financial crisis). However, in systemic global crises like COVID-19, where shocks are external and non-financial in nature, both Islamic and conventional indices experienced significant and sustained volatility. Islamic indices, due to their structure, provide a more stable alternative during crises, especially in terms of moderating initial shocks. However, the persistence of volatility across both Islamic and conventional indices suggests that additional risk management is essential, even with Islamic finance principles in place.

5.2. Policy Recommendations

Findings of the study are significant for policy makers and stock holders who aim to invest in the portfolio that maximize their profit and minimize risk.

- Risk-averse investors who want to minimize the effect of instant losses due to abrupt crisis Islamic indices are good option because of strong initial resistance element of Islamic indices.
- Government intervention is suggested in case of external crisis like COVID-19 to deal with the prolonged adverse effects of volatility by employing the strategies of decentralized finances, capital adequacy ratios and trading curbs.
- Policy makers are also suggested to arrange awareness seminars to educate stock holders regarding fundamentals of Islamic indices and their inbuilt quality of strong initial shock resistance.
- Collaborations of Islamic and traditional indices and cross border investments in Sharia indices may also be helpful in creating the environment of diversification. Researchers should focus on the core principles of Islamic indices that provide strong initial resilience against volatility during shocks in the short run and propose methodologies to utilize these fundamentals to create long period resilience.

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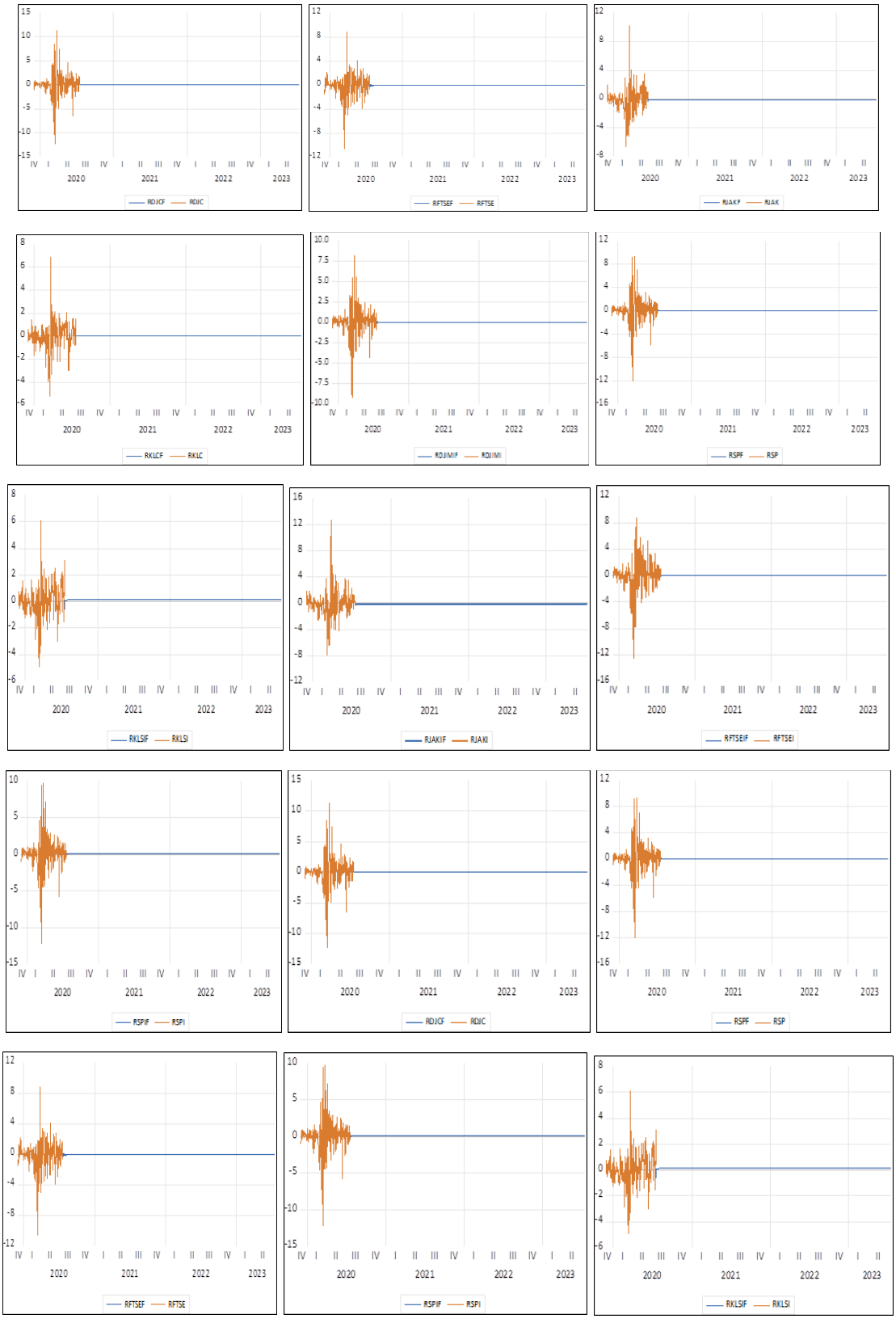
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APPENDIX


2020
2021
2022
2023
RDJCF
RDJC
RFTSEF
RFTSE
RJAKF
RJAK
RKLCF
RKLC
RDJMIF
RDJMI
RSPF
RSP
RKLSIF
RKLSI
RJAKIF
RJAKI
RFTSEIF
RFTSEI
RSPIF
RSPI