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Financial Integration among Shariah-compliant Indices: Empirical Evidence from Global Stock Markets

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Abstract

Due to the interdependence of the markets, investors have several options for arbitraging and diversifying their portfolios. New and creative securities have been added to the international stock exchanges. Global investors have quickly become interested in Shariah-compliant security indexes. This study will look at these relationships to better understand the long- and short-term dynamics of financial integration among Shariah-compliant indices and the causal effect among these markets. Daily data for Karachi Meezan Islamic Index (KMI-30), Dow Jones Islamic Index (DJII), Standard and Poor 500 Index (S&P-500), Jakarta Islamic Index (JII), and MSCI Islamic Index have been take from 2018–2022. The data was stationary at integrated order I(1) by using the ADF test. Co-integration and VECM tests have been used to identify long-run and short-run linkages and identified that there exists evidence for short-and long-term relationships among these indices. Using the Granger Causality Test, the connection among these markets determines unidirectional and bidirectional lead and lag linkages. Finally, it is concluded that foreign investors can benefit from passive portfolio diversification opportunities and achieve abnormal profits through arbitrage.

Key Words: Shariah compliance, arbitrage, Co-integration, VECM, Portfolio Diversification

Introduction

Globalization and modernization of equity markets have encouraged investors worldwideto avail more portfolio investment diversification opportunities. The integration of the global financial markets has tremendously affected the dynamic movements of the stock market. The financial market integration today tends to eliminate barriers in allocating capital more efficiently. The findings from many studies regarding market integration put light on essential implications for the diversification of investments internationally and focus on market efficiency. Since the

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management of investing activities can lower risk by investing in low-integrated routes and investment plans, the diversification idea is also applied to domestic portfolios. The changing dynamics have introduced Islamic indices and provided more innovative idea for Shariah compliance securities trading.

Many Islamic indices have been introduced globally to satisfy the growing mandate for Shariah yielding avenues in equity markets. Due to increased investor interest, the market share of Shariah-compliant funds is increasing (Mansoor & Siddiqui, 2019). Even though how Shariah is applied can differ depending on interpretation, it generally significantly impacts a company's strategic management live-out and the corresponding continuing financial enactment, even following its principles. Investment in the Shariah-compliant equity market by the Shariah board encompasses scholars who are competent to issue religious verdicts on financial transactions. This board of experts guarantees chockfull defiance of the investments and dealings with Islamic principles. If the stock markets have solid associations and integrated relationships, trading in respecting countries is assumed to increase. However, the movement of share prices in connection to each other across the stock markets in the world is a repeatedly veteran portent. Stock markets are known to tumble in tandem, especially during times of crisis. Many investors find Islamic financing as a socially conscious side very intriguing, yet some continue to doubt how well it performs financially compared to traditional assets (Belghiti & Hamza, 2022).

Islam encourages societal and individual capacity growth, social justice, and sustainable development. Compared to traditional financial markets, Islamic financial markets are thought to be more stable. It is commonly known that financial globalization, the reduction of investment obstacles, economic integration, financial innovation, and technology improvement are all factors contributing to the integration of the world's financial markets (Abdul Karim & Abdul-Rahman, 2020). However, a large portion of the investment is made through private placement and it is challenging to determine the business scope accurately. Additionally, since the resources are not operated on secondary markets, we have limited access to information on their constituents. This study aims to satisfy the Islamic investor’s prerequisites who want to broaden the horizons of their portfolios in light of various global locations while considering investments that adhere to Shariah. The study investigates the level of financial integration among different Shariah-compliant indices.

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Moreover, this study investigates this relationship in shorter and longer terms. It is also essential to determine how relationships affect investors around the globe.

Literature Review

Over the past few years, developing markets have become increasingly important; market interaction has drawn the attention of financial economists due to its significance for international incorporation and financial liberalization Hung & Binh, (2019). Numerous studies have done empirical studies of share prices' behavior of co-movement across worldwide economic marketplaces; for example, Jebran et al. (2017), Joshi (2011), Jin (2016), Gupta and Guidi (2012), Balli et al. (2015). Hamid & Hasan (2011) ascertained long and short-run dynamic connections between KSE and several developed and emerging stock markets from January 1998 to December 2008. There were 132 monthly stock return observations made. They employed various time series data analysis approaches to determine the presence of both short- and long-term associations. According to empirical results, the KSE-100 is a volatile market producing appropriate returns. Furthermore, long-term and short-term correlations exist between the stock markets in question. Subsequent investigation showed that other markets had less effect on KSE and that the new innovations had significantly changed KSE-100 relationship with other markets.

Al Nasser et al (2016) investigated the combination of stock markets in five technologically sophisticated and emerging markets. To determine the short- and long-term relationships between the returns of the advanced stock markets, the co-integration technique and EC modelling are applied to monthly data spanning from the first month of 2001 to the last month of 2014. The consequences displayed an indication of short-term integration between established markets and stock markets in developing nations. Only the market returns in Germany showed a significant correlation with the long-run coefficients for market returns in each evolving country. Numerous scholars have attempted to investigate the relationship between Islamic equity indices in light of the growing significance of Islamic finance. However, no definitive conclusions can be drawn from the findings described in the extant research. For instance, several studies have shown that there is no connection between Islamic securities.

Majdoub and Mansour (2013), Saiti et al. (2014), and Karim et al. (2010) examined how the world economic crisis affected co-movements of share prices and resultantly the combination of

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Islamic stock markets. The analysis period was subjected to identify long run relationships, which investigated that the subprime mortgage crisis urged in 2007 hadno impact on the co-movements in the long run between the Islamic stock markets. In contrast, variousstudies have documented a connection between Islamic assets' behavior in the circumstance of predicament Kassim (2012). Abduh (2020) investigated the Islamic index in the Malaysian market as less volatile during crises than the conventional index, demonstrating the Islamic market's resilience. Asutay et al. (2022) examined a study to check the presentation of Islamic and Conventional indexes in the US Market through the crises. The study's outcome revealed that the Islamic index achieves better than the conventional index. Moreover, results evidence that Islamic indices establish less risk and loss.

Alahouel and Loukil (2020) researched to explore the uncertainty of the Islamic and conventional stock market. They used three market indices i.e Dow Jones, S&P, and MSCI market. Data was taken from January 1, 2008, to June 30, 2018. The author used mean, median, and variance to check the trend of the data. Interrelationship was checked by employing OLS and the Vector model. Conclusions showed that Islamic assets' uncertainty differs from conventional assets.

Khatri, et al. (2022). The study aimed to determine whether Shariah or non-Shariah stock market indices are better for investment. A study was conducted to find which index is better regarding risk and trade-off returns. DSES and DSEX denote Shariah and non-Shariah, respectively, for Bangladesh. On the other hand, for Pakistan, KMI-30 and KSE-30 were taken for Shariah and non-Shariah. Data was taken through secondary information from the period of January 2015 to June 2021 weekly. Results were retrieved through OLS, REM and FEM models. Results confirmed that the non-Shariah index accomplished more than Shariah in DSE. On the other hand, PSX data showed that the Shariah index performed efficiently compared to the non-Shariah index in Pakistan.

Data and Methodology

Financial integration and co-movements among Shariah-compliant indices have been investigated and the data has been taken for five Islamic indices of global investments, i.e., Karachi Meezan Islamic Index (KMI-30), Dow Jones Islamic Index (DJII), Standard and Poor 500 index (S& P-500), Jakarta Islamic Index (JII) and MSCI. Historical data of daily prices has been taken for the period 2018 to 2022 and analyzed the data by using E-views 12 software. The tendency of the

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returns is determined using descriptive statistics. Correlation is employed to determine the relationships between Islamic returns. The stationarity of the data is determined by using the Unit Root Test (ADF). The short-term association between the shariah-compliant indices is identified by using VECM, while the long-term relationship is ascertained through the Co-integration Test. The study employed the Granger causality test to determine the lead and lag relationship.

$$IR_t = \ln\left(\frac{P_t}{P_{t-1}}\right) - - - - - - - - - - - - - - -$$

Whereas,

IR_t= *Islamic Returns*
P_t = *Islamic Indices value at time t*
P_{t-1} = *Islamic Indices value at time t-1*

Results and Discussion

The figure below shows that the markets have suffered deeply from the COVID-19 pandemic and reflect strong integration from the 1st quarter of 2020 to the 2nd quarter of 2021. However, it is identified that market movements behave similarly during the period of financial crunch, and the same happened for Shariah Compliant Securities.

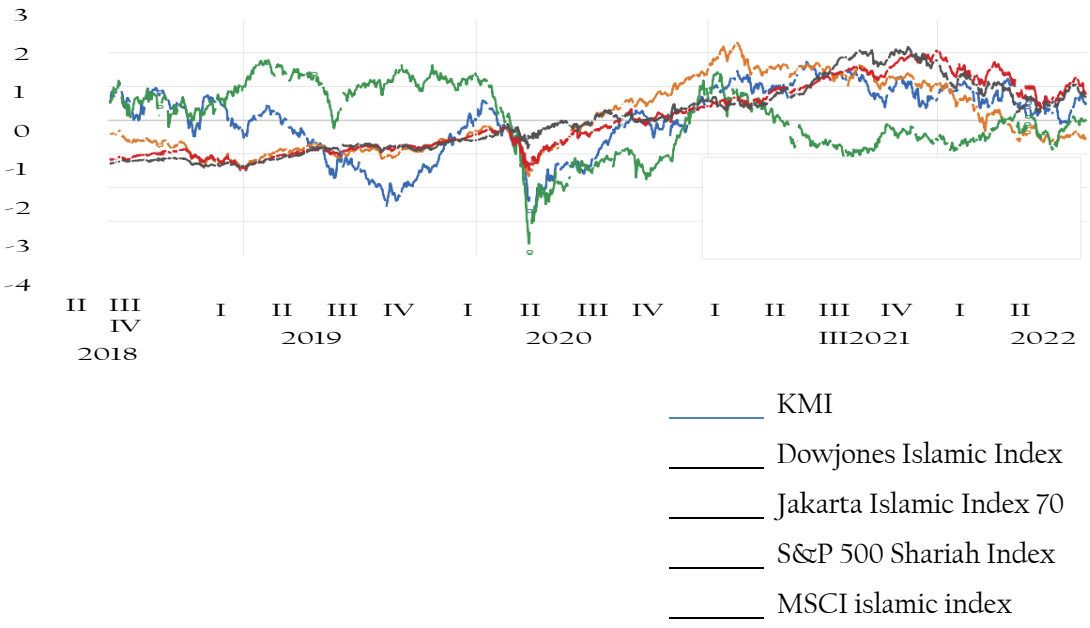

Figure 1: Trend of Global Islamic Stock Indices

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Table 1 indicates the descriptive statistics for the returns of the global Shariah-compliant indices and hence, it is identified that the mean return of DJII, JJII70, and KMI produced negative returns. However, the mean returns of the MSCIII and SP500SI were positive and very high. All series have negative skewness, meaning negative returns are more significant than positive ones during this regime.

Table 1: Descriptive Statistics for Global Islamic Returns

	DJII-R	JII70-R	KMI-R	MSCIII-R	SP500SI-R
Mean	-0.09602	-0.01162	-0.21909	0.308421	1.459631
Median	1.46000	0.060000	7.410000	0.620000	2.880000

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Maximum	110.4300	16.25000	3157.920	31.88000	220.3100
Minimum	-111.7200	-15.01000	-4273.010	-54.30000	-328.7400
Std. Dev.	25.25707	2.693482	962.6713	8.650829	47.59289
Skewness	-0.380268	-0.238540	-0.348890	-0.665587	-0.826860
Kurtosis	5.059433	6.698327	5.007888	7.307383	9.438253
Jarque-Bera	195.7994	564.9000	183.5645	825.7264	1795.052
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	-93.62000	-11.33000	-213.6200	300.7100	1423.140
Sum Sq. Dev.	621333.7	7066.219	9.03E+08	72891.08	2206191.
Observations	975	975	975	975	975

The results of Table 2 indicate that the ADF test is used to identify the presence of unit root with constant and without constant and trend. It is identified that at a level, no unit root has been identified, whereas, at first difference, the series becomes stationarity.

Table No 2: Unit Root Test

Null Hypothesis: The variable has a unit root						
	At Level					
		DJII	JJII70	KMI	MSCIII	SP500SI
With Constant	t-Statistic	-0.943	-2.176	-1.831	-1.189	-1.122
	Prob.	***0.774***	***0.215***	***0.365***	***0.680***	***0.708***
		n0	n0	n0	n0	n0
With Constant & Trend	t-Statistic	-0.446	-2.375	-2.264	-1.361	-1.762
	Prob.	***0.986***	***0.392***	***0.453***	***0.872***	***0.723***
		n0	n0	n0	n0	n0
Without Constant & Trend	t-Statistic	-0.275	-0.337	-0.232	0.653	0.817
	Prob.	***0.586***	***0.563***	***0.602***	***0.857***	***0.888***
		n0	n0	n0	n0	n0
	At First Difference					
		DJII	JJII70	KMI	MSCIII	SP500SI
With Constant	t-Statistic	-28.758	-32.407	-30.026	-34.394	-35.931
	Prob.	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
		***	***	***	***	***
With Constant & Trend	t-Statistic	-28.768	-32.392	-30.018	-34.391	-35.919
	Prob.	***0.000***	***0.000***	***0.000***	***0.000***	***0.000***
		***	***	***	***	***
Without Constant & Trend	t-Statistic	-28.773	-32.423	-30.042	-34.364	-35.911
	Prob.	***0.000***	***0.000***	***0.000***	***0.0000***	***0.000***
		***	***	***	***	***

Table 3 indicates strong co-integration among the Shariah Compliance indices, asindicated below by Trace statistics and Maximum Eigen Value Tests. Hence, in both tests, five co-

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integrating vectors exist. The results provide a strong long-run relationship among these market indices.

Table 3: Johansen Co-integration Test

Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.214	958.607	69.818	0.000
At most 1 *	0.204	724.971	47.856	0.000
At most 2 *	0.179	502.953	29.797	0.000
At most 3 *	0.171	310.953	15.494	0.000
At most 4 *	0.125	130.049	3.841	0.000

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.214	233.637	33.876	0.000
At most 1 *	0.204	222.017	27.584	0.000
At most 2 *	0.179	192.001	21.132	0.000
At most 3 *	0.171	180.903	14.264	0.000
At most 4 *	0.125	130.049	3.842	0.000

Table 4 indicates that the stock returns have a positive significant correlation among eachother except KMI-R, MSIII-R, and SP 500SI-R. The result indicates that a short-run relationship exists among the returns of Islamic indices.

Table 4: Correlation Matrix

	DJII-R	JII70-R	KMI-R	MSCIII-R	SP500SI-R
DJII-R	1				
JII70-R	0.45*	1			
KMI-R	0.15***	0.17***	1		

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MSCIII-R	0.30**	0.14***	0.05	1	
SP500SI-R	0.39**	0.23***	0.08	0.75*	1

*P<0.01, **p<0.05 and ***p< 0.10

The VECM model indicates clear evidence regarding the short-run relationships among the markets returns at Lag 1 and Lag Length 2.

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Table No 5: Vector Error Correction Model

Error Correction:	D(DJII, 2)	D(JII70,2)	D(KMI,2)	D(MSCIII,2)	D(SP500SI,2)
CointEq1	-0.072	-0.017	5.178	-0.001	0.117
	-0.014	-0.001	-0.545	-0.005	-0.027
	[-5.21571]	[-11.4985]	[9.50889]	[-0.29817]	[4.27999]
D(DJII(-1) , 2	-0.683	0.006	-4.672	-0.018	-0.127
	-0.036	-0.004	-1.414	-0.013	-0.071
	[-19.0952]	[1.50573]	[-3.30447]	[-1.39432]	[-1.78507]
D(DJII(-2),2)	-0.252	0.007	-0.062	-0.025	-0.203
	-0.034	-0.004	-1.342	-0.012	-0.068
	[-7.42155]	[1.87333]	[-0.04629]	[-2.04255]	[-2.99973]
D(JII70(-1),2)	1.148	-0.307	-127.795	0.027	-3.273
	-0.438	-0.046	-17.298	-0.159	-0.872
	[2.62252]	[-6.69721]	[-7.38772]	[0.16748]	[-3.75436]
D(JII70 (-2),2)	0.664	-0.229	-60.433	0.091	-1.240
	-0.333	-0.035	-13.175	-0.121	-0.664
	[1.99233]	[-6.55993]	[-4.58688]	[0.75202]	[-1.86809]
D(KMI(-1),2)	-0.004	-0.001	-0.379	0.000	0.005
	-0.001	0.000	-0.038	0.000	-0.002
	[-3.76162]	[-9.10833]	[-10.0285]	[0.25378]	[2.48880]
D(KMI(-2),2)	-0.001	-0.001	-0.215	0.000	0.004
	-0.001	0.000	-0.032	0.000	-0.002
	[-0.98294]	[-5.91515]	[-6.73139]	[0.70078]	[2.20732]
D(MSCII (-1),2)	0.474	0.054	-22.693	-0.646	-0.285
	-0.131	-0.014	-5.190	-0.048	-0.262
	[3.60762]	[3.91140]	[-4.37268]	[-13.5667]	[-1.09103]
D(MSCISI(-2),2)	0.355	0.025	-16.156	-0.324	0.021
	-0.125	-0.013	-4.936	-0.045	-0.249
	[2.84006]	[1.89469]	[-3.27277]	[-7.15452]	[0.08338]
D(SP500SI(-1),2)	0.039	-0.018	10.636	-0.030	-0.611
	-0.032	-0.003	-1.273	-0.012	-0.064
	[1.19953]	[-5.40422]	[8.35364]	[-2.53112]	[-9.51830]
D(SP500SI(-2),2)	0.033	-0.010	5.634	-0.011	-0.278
	-0.026	-0.003	-1.019	-0.009	-0.051
	[1.26885]	[-3.82805]	[5.53147]	[-1.18512]	[-5.41441]
C	-0.044	-0.004	-0.114	0.002	-0.026
	-0.866	-0.091	-34.232	-0.314	-1.725
	[-0.05090]	[-0.04673]	[-0.00332]	[0.00721]	[-0.01525]

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Table 7 indicates the results of the Granger Causality Test. It is seen that KMI_R and DJII_Rhave bilateral causality. However, MSCII has unilateral causality with DJII_R, JII70, and KMI-R. However, SP500SI-R has unilateral causality with DJII_R, JII70_R, KMI_R, and MSCII_R,Further JII70-R has unilateral causality with KMI_R.

Table 6: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
JII70-R ~~~~~~~~~~~~~~~~~~~~ DJII_R	970	1.378	0.230
DJII_R ~~~~~~~~~~~~~~~~~~~~ JII70-R		1.736	0.124
KMI_R ~~~~~~~~~~~~~~~~~~~~ DJII_R	970	1.881	0.095**
DJII_R ~~~~~~~~~~~~~~~~~~~~ KMI_R		2.618	0.023*
MSCII-R ~~~~~~~~~~~~~~~~~~~~ DJII_R	970	20.607	0.000*
DJII_R ~~~~~~~~~~~~~~~~~~~~ MSCII-R		0.851	0.514
SP500SI-R ~~~~~~~~~~~~~~~~~~~~ DJII_R	970	28.307	0.000*
DJII_R ~~~~~~~~~~~~~~~~~~~~ SP500SI-R		0.612	0.691
KMI_R ~~~~~~~~~~~~~~~~~~~~ JII70-R	970	1.528	0.178
JII70-R ~~~~~~~~~~~~~~~~~~~~ KMI_R		3.394	0.005*
MSCII-R ~~~~~~~~~~~~~~~~~~~~ JII70-R	970	8.007	0.000*
JII70-R ~~~~~~~~~~~~~~~~~~~~ MSCII-R		1.776	0.115
SP500SI-R ~~~~~~~~~~~~~~~~~~~~ JII70-R	970	11.575	0.000*
JII70-R ~~~~~~~~~~~~~~~~~~~~ SP500SI-R		0.263	0.933
MSCII-R ~~~~~~~~~~~~~~~~~~~~ KMI_R	970	2.386	0.037*
KMI_R ~~~~~~~~~~~~~~~~~~~~ MSCII-R		1.454	0.202
SP500SI-R ~~~~~~~~~~~~~~~~~~~~ KMI_R	970	3.779	0.002*
KMI_R ~~~~~~~~~~~~~~~~~~~~ SP500SI-R		1.217	0.299
SP500SI-R ~~~~~~~~~~~~~~~~~~~~ MSCII-R	970	3.521	0.004*
MSCII-R ~~~~~~~~~~~~~~~~~~~~ SP500SI-R		1.515	0.182

Conclusion

Financial market integration has gained too much attention due to globalization, information technology communication, investors' information efficiency, and innovation in financial assets. Shariah compliance securities have gained much consideration during the last decade. The primary

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purpose of this research was to identify the stock market integration during this pandemic period. For this purpose, the Shariah-compliant indices data has been taken from the Karachi Meezan Islamic Index (KMI-30), Dow Jones Islamic Index (DJII), Standard and Poor Index (S&P-500), Jakarta Islamic Index (JII), and MSCI. Historical data of daily prices has been taken from 2018 to 2022. The results conclude that the market produced mainly negative returns, but MSCIII and SP500SI generated positive returns. Most of the trend of the returns remained negatively skewed during this regime. The indices remained non-stationary at integrated order I (0) at the level but got stationary at integrated order I(1). Results reveal strong co-integration among the Shariah Compliance indices during this period. There is a long-run relationship between all these Shariah Compliant indices. It is further concluded that short-run relationships among the markets is found during one or two years, and further correlation results also supports this argument. reveal bilateral causality between the KMI_R and DJII_R. However, all other markets have unilateral causality with each other market. Our results are not too coherent with those of past studies. Hence, it is concluded that during the COVID-19 pandemic, co-movements remained significantly very close, and portfolio diversification opportunities remained passive. To enhance trade and mutual economic cooperation regarding investing activities financial and economic integration is quite necessary among the developing economies (Khurram et al (2109). This study also supports this argument. In future studies, the volatility of these indices can be modeled with macro-economic forces.

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