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Calendar Anomalies and the Islamic Stock Market Returns: Evidences on day of the week effect

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Abstract
The purpose of this study is to investigate the impacts of calendar anomalies specifically on day of the week effect (DOW) on 10 Islamic stock markets' returns such as Dow Jones Islamic Market (DJIM), Saudi Arabia, Malaysia, United Arab Emirates (UAE), Kuwait, Qatar, Turkey, Indonesia, Bahrain, Pakistan—for 20 years from 25 September 2000 to 24 September 2020. The methods of study using Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) and Exponential Generalized AutoRegressive Conditional Heteroskedasticity (EGARCH) as a robustness test. The findings revealed that calendar anomalies had considerable impacts on returns for the following Islamic stock markets: DJIM, Indonesia, and Pakistan.

Keywords: Calendar anomalies; day of the week effect; GARCH; EMH.

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1.0 Introduction

Islam has become a fast-growing religion in recent years, resulting in increased demand for Islamic financial products because existing conventional financial products do not comply with Muslim investors' religious convictions. At the same time, from the perspective of devout Muslims, the current form of stock markets restricts Muslims from making investments in the markets due to non-compliance of the stocks with the shariah parameters. As a result, Islamic finance has received much attention in recent decades. However, empirical results show that Islamic stock indices are more volatile than their conventional counterparts and are not totally immune to global financial crises. In terms of informational efficiency, Ben Rejeb and Arfaoui (2019) show that Islamic stock indices are more efficient than conventional stock indices. Indeed, investors have to consider informational efficiency given that they can easily determine the risk and profitability of their investments in an efficient market. Calendar anomalies (CA) have been demonstrated to contradict the EMH in several empirical works of literature. CA, in essence, presents a challenge to the EMH and has attracted economists' curiosity for many years. Empirical results on CA are still mixed due to differences in the data collection, data frequency, data period, and method utilized. In the analyses, the types of market, financial asset, and stock market county are all different. The existence of Calendar Anomalies (CA) refutes a weak version of the Efficient Market Hypothesis (EMH), which claims that stock returns are time-invariant thus implying that there is no short-term seasonal pattern in stock returns. Seasonal trends in stock returns indicate that a market is inefficient and that investors should be able to achieve higher-than-average returns. Investors will find it easier to make an investment decision based on both returns and risks if they can spot a pattern in volatility. Therefore, the purpose of this study is to examine the existence of well-known calendar anomalies: the day of the week (DOW) effect, on Islamic stock market returns by using Generalized AutoRegressive Conditional Heteroskedasticity (GARCH) and Exponential Generalized AutoRegressive Conditional Heteroskedasticity (EGARCH) as a robustness test. The study focuses on 10 Islamic

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stock market returns for 20 years from September 2000 until September 2020. The Dow Jones Islamic Market (DJIM) is used as a benchmark for nine stock markets from Saudi Arabia, Malaysia, the United Arab Emirates (UAE), Kuwait, Qatar, Turkey, Indonesia, Bahrain, and Pakistan.

2.0 Literature Reviews

Fama (1970) made a significant contribution to operationalizing the concept of market efficiency. The efficient market hypothesis (EMH) has been a popular topic in finance and mainstream economics since the late 1950s and early 1960s when it was known as the "theory of random walks" in finance and "rational expectations theory" in mainstream economics. According to the hypothesis, efficient markets take a random walk, and past data cannot be used to forecast future stock prices. Yalçn (2010), on the other hand, claimed that irrational investment activity and limited market arbitrage opportunities generate market anomalies that contradict the EMH. The day-of-the-week effect (DOW) is one of the most widely documented calendar anomalies (CA), according to which asset returns are significantly higher on some days of the week than on other days. The empirical literature for this anomaly includes, for example, the DOW effect is present in the South African stock market index (Du Toit et al.,2018). Gharaibeh and Hammadi (2013) investigated the existence and conditional nature of the DOW anomaly whilst Yatiwella (2011) explored the existence of CA in the Colombo Stock Exchange (CSE) from 1985 to 2005. Their results implied that stock returns in the CSE during the 1995–2005 period were not entirely consistent with the random walk hypothesis. Singh (2014) investigated the prevalence of stock market anomalies in four emerging stock markets. For Brazil, Russia, and India, the analysis validated the EMH for DOW effect. However, a statistically significant negative return was found for the Chinese stock market on Tuesday. This finding suggests that an investor could use the information on unusual returns to enter the stock market a day early and make profits. Plastun et al. (2019) explored the evolution of CA in the US stock market, focusing on the DOW effect, turn-of-the-year (TOY) effect, and the holiday effect. The findings suggest that the 'golden period' of CA occurred around the turn of the twentieth century. Since the 1980s, however, all CA had vanished, thus supporting the EMH. Although academic financial economists generally embrace the efficient market concept, evidence opposing it has emerged in recent years. The DOW, monthly, and holiday effects in the stock markets have been investigated with mixed conclusions. This anomaly still appears to exist in many emerging markets (Caporale and Plastun, 2017; Khan et al.,2021), Kuala Lumpur Composite Index (KLCI) (Lim et al., 2010; Muhammad and Rahman, 2010), ASEAN-five stock markets of Indonesia, Malaysia, the Philippines, Singapore, and Thailand (Lim and Chia, 2010), Saudi Stock Exchange (Farooq et al., 2013) and Thailand Stock Exchange (Sutheebanjard and Premchaiswadi, 2010). Moreover, DOW effect are not only present in the equity market but also in Bitcoin and other cryptocurrencies markets (Kurihara and Fukushima, 2017; Aharon and Qadan, 2018; Ma et al.,2019; Caporale et al., 2019) and commodity markets (Qadan and Idilbi-baya, 2021). In summary, Zhang et al. (2017) argue that the day of the week effect can assist investors in deciding portfolio selection, profit management, and overall investment strategy.

3.0 Research Methodology

In 1986, Bollerslev and Taylor modified the ARCH model into a generalized version known as GARCH. In GARCH models, the variance of the residuals is expressed as the sum of a moving-average polynomial of order *q* on past residuals (the ARCH term) plus an autoregressive polynomial of order *p* on past variances (the GARCH term). Alexander (2001) stated that the conditional variance equation of the GARCH model is an autoregressive process. The conditional variance of the GARCH model in the simplest case can be described by the following equation:

$$\sigma^2_{j,t} = \alpha_0 + \alpha_1 \varepsilon^2_{j,t-1} + \beta_1 \alpha^2_{j,t-1} \quad (3.1)$$

The equations are known as the GARCH (1, 1) model (Bollerslev and Taylor, 1988). Equation 3.1 shows that the conditional variance of asset j () is a linear function of lagged squared error term () and lagged conditional variance of asset j ( ). The coefficient shows the effect of price shocks in asset j on the current conditional volatility of asset j. The coefficient represents the effect of past conditional volatility of asset j on the current volatility of asset *j*. The GARCH model is similar to the ARCH model in the sense that it imposes a non-negativity constraint on the coefficient estimated in the conditional variance. Equation 3.2 shows the constraints in which coefficient should be greater than 0, and coefficients and should be greater than or equal to 0.

$$\sigma^2_{j,t} = \alpha_1 \varepsilon^2_{j,t-1} \quad (3.2)$$

The daily closing prices of the stock indices were collected as data for this study. The daily closing prices and daily settlement prices data were transformed into continuously compounded returns by using the following formula:

$$r_t = In(\frac{P_t}{P_{t-1}})x100 \quad (3.3)$$

Equation 3.3 shows r_t, which is the return at time *t*, is equal to the logarithmic difference of the closing price at time *t* and the closing price at time $t-1$. The continuous compounded return was used because it is unit free and thus the return across the market can be easily compared (Brook, 2008). In this study, the DOW effect has five dummy variables for the daily data. This method delivers a 5-day sample

for each week excluding the weekend when the stock market is closed (Chatzitzisi et al. 2021; Kumar and Pathak, 2016; Osazee, 2014). Monday is the benchmark while four dummy variables are defined as follows: $D1_t = 1$ on Monday, $D1_t = 0$ otherwise.

$$r_t = \gamma_1 D_{1t} + \gamma_2 D_{2t} + \gamma_3 D_{3t} + \gamma_4 D_{4t} + \gamma_5 D_{5t} + \mu_t \quad (3.4)$$

where r_t is the return at time t for each country examined separately, D_{1t} is a dummy variable for Monday taking the value of 1 for all Monday observations and zero otherwise. The coefficient estimates can be interpreted as the average sample return on each day of the week. According to Brooks (2002), dummy variables can also be used to test other types of CA such as the month effect and the holiday effect, and a given regression can include dummies of different frequencies at the same time.

The robustness test used for the first objective is the EGARCH model, which is an extended form of the GARCH model. The EGARCH model was proposed by Nelson (1991) to overcome the weakness in GARCH when handling financial time series. In addition, it allows for asymmetric effects between positive and negative asset returns. The EGARCH model differs from the standard GARCH model in two main aspects: (i) the EGARCH model allows good news and bad news to have different impacts on volatility, while the standard GARCH model does not, and (ii) the EGARCH model allows big news to have a greater impact on volatility than does the standard GARCH model. The EGARCH (1,1) model can be expressed in the following forms:

$$\sigma_{j,t}^2 = \exp\left[\alpha_0 + \alpha_1 f_j(Z_{j,t-1}) + \delta_j In(\alpha_{j,t-1}^2)\right] \quad (3.4)$$

$$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|) + \gamma_j Z_{j,t-1}) \quad (3.5)$$

Equation 3.5 shows the conditional variance of asset *j* as an exponential function of its own standardized innovation. The coefficient shows the effect of lagged conditional variance on the current conditional volatility of asset *j*. The coefficient shows the volatility persistence of market *j*. In addition, the coefficient represents the asymmetric effect on the volatility of asset *j*. Statistically significant negative means bad news has a greater impact than good news on the conditional volatility. On the other hand, significant positive coefficient shows that volatility is higher in the bull market than in the bear market.

4.0 Findings and Discussions

The Islamic stock market in Indonesia was the most active and profitable during the study period, with an average daily return of 4.2%. Malaysia, Qatar, Pakistan, DJIM, and Saudi Arabia recorded average daily returns of 2.5%, 2%, 1.55%, and 0.5%, respectively. Bahrain, Kuwait, and Turkey, on the other hand, experienced negative average daily returns. All countries had positive median returns except for Bahrain (−0.53%). The Turkish Islamic stock market had the highest standard deviation (2.1510), whereas the Malaysian Islamic market had the lowest standard deviation (0.8491).

Table 4.1: Descriptive Statistics of Daily Stock Return for Countries from 25 September 2000 to 24 September 2020

	BAHRAIN	DJIM	INDONESIA	KUWAIT	MALAYSIA	PAKISTAN	QATAR	SAUDI ARABIA	TURKEY	UAE
Mean	-0.0265	0.0150	0.0419	-0.0062	0.0248	0.0188	0.0203	0.0066	-0.0070	-0.0046
Maximum	5.4726	9.4321	12.0136	9.4311	13.2108	8.3578	12.4920	9.4061	18.6273	17.6673
Minimum	-4.2648	-8.9329	-14.1930	-20.4253	-10.9537	-11.3475	-16.7850	-11.6074	-19.9262	-18.4676
Std. Dev.	0.9188	0.9857	1.5218	1.5787	0.8491	1.5906	1.5933	1.2085	2.1510	1.7753
Skewness	0.2038	-0.2466	-0.6513	-1.5115	-0.2291	-0.3749	-0.6637	-1.2083	-0.5391	-0.5114
Kurtosis	6.7429	14.214	12.3578	20.4000	32.8743	6.5226	17.6492	20.8188	11.6935	18.1169
Observations	1230	5551	4865	2751	4248	2676	2830	4391	3127	3423

Table 4.2: Results for the day of the week effect

No.	INDEX	Days	Monday (D1)	Tuesday (D2)	Wednesday (D3)	Thursday (D4)	Friday (D5)
1	Dow Jones Islamic Market World Index	Monday, Tuesday, Wednesday, Friday	0.0698***	0.0599***	0.0692***	0.01723	0.0376**
2	Dow Jones Islamic Market Malaysia Titans 25 Index	Tuesday, Friday	0.0131	0.0442**	0.0309	0.0267	0.0355*
3	Jakarta Islamic Index	Monday, Tuesday, Wednesday, Friday	-0.0775**	0.0854**	0.1490***	0.0215	0.1509***
4	S&P Saudi Arabia Shariah Index	Wednesday, Thursday	-0.0275	0.0146	0.0549**	0.0880***	-0.0546
5	FTSE NASDAQ Dubai Kuwait 15 Shariah Index	Monday, Tuesday	-0.0946***	0.1291***	0.0599	-0.0012	-0.4800

6	FTSE NASDAQ Dubai UAE 20 Index	Wednesday, Thursday, Friday	0.0278	-0.0217	0.1146***	0.1551***	-0.5969***
7	FTSE NASDAQ Dubai Qatar 10 Shariah Index	Wednesday, Thursday	0.0298	0.0397	0.0849**	0.087**	NA

Table 4.2 shows a summary of the DOW effects. The Monday effect (D1) was present in DJIM World Index and FTSE NASDAQ Dubai Kuwait 15 Shariah Index at the 1% level. Jakarta Islamic Index and FTSE Pakistan Shariah Index also had a significant Monday effect at the 5% and 10% levels of significance, respectively. The Monday effect is a theory that states that the stock market returns on Mondays will follow the prevailing trend from the previous Friday. Therefore, if the market was up on Friday, it should continue through the weekend and, on Monday, resume its momentum and vice versa. The Monday effect is also known as the "weekend effect". The Monday effect has been attributed to the impact of short selling, the tendency of companies to release more negative news on a Friday night, and the decline in market optimism some traders experience over the weekend.

Al-Khazali and Mirzaei (2017) found that the lowest mean return was on Monday and the highest on Friday for all Islamic indices except Emerging and Global Islamic indices. These findings are consistent with most of the previous studies on the DOW effect on conventional stock indices. For the Emerging and Global Islamic indices, they observed that the lowest mean return was on Tuesday and the highest on Thursday. However, this study found that the mean return and the standard deviation of return tended to be highest on Monday and lowest on Friday for all the Islamic stock market indices. In contrast, Perez (2018) found that for the 2011–2016 period, there was no statistically significant Monday effect but interestingly there were indications of a possible Thursday effect on the Chinese stock markets.

The Tuesday effect was also found in stock markets that had significant Monday effects. In addition, DJIM Malaysia Titans 25 Index also had a significant Tuesday effect at the 5% level. In contrast, Anwar and Mulyadi (2009) found positive abnormal returns on Friday in Indonesia and Malaysia, but no Friday positive abnormal return was found in Singapore. Besides, the study also concluded that there was no Monday negative abnormal return in all three countries. Wednesday effect was also found in the majority of Islamic countries except for Malaysia, Kuwait, and Turkey. Furthermore, the majority of Middle East countries recorded a significant Thursday effect. The Friday effect was significant at the 1% level for Jakarta and UAE Islamic stock indices. Zhang et al. (2017) applied the method of rolling sample test and the GARCH model to investigate DOW anomalies in the stock returns of main indices in 28 markets from 25 countries worldwide and demonstrated that calendar anomalies were prominent in those markets.

Table 4.3: Robustness test results for the DOW effect

No.	INDEX	GARCH	EGARCH
1	Dow Jones Islamic Market World Index	Monday, Tuesday, Wednesday, Friday	Monday, Tuesday, Wednesday
2	Dow Jones Islamic Market Malaysia Titans 25 Index	Tuesday, Friday	Tuesday, Friday
3	Jakarta Islamic Index	Monday, Tuesday, Wednesday, Friday	Monday, Tuesday, Wednesday, Friday
4	S&P Saudi Arabia Shariah Index	Wednesday, Thursday	Monday, Thursday
5	FTSE NASDAQ Dubai Kuwait 15 Shariah Index	Monday, Tuesday	Monday, Tuesday
6	FTSE NASDAQ Dubai UAE 20 Index	Wednesday, Thursday, Friday	Wednesday, Thursday, Friday
7	FTSE NASDAQ Dubai Qatar 10 Shariah Index	Wednesday, Thursday	-
8	FTSE Turkey Shariah Index	Thursday	Thursday
9	Bahrain Islamic Index	Wednesday	Wednesday
10	FTSE Pakistan Shariah Index	Monday, Tuesday, Wednesday, Friday	Monday, Wednesday, Friday

Table 4.3 shows a summary of the DOW effects where EGARCH and GARCH models produced consistent results. In this study, the Monday effect was found for DJIM, Indonesia, Kuwait, and Pakistan. This finding is consistent with the result of the GARCH model. The result is consistent with Gharaibeh (2021) who found the DOW effect in Kuwait when examining CA in GCC (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, Abu Dhabi, and Dubai) stock markets using the closing price indices for these markets for the 2012–2017 period. This finding is also consistent with Ariss et al. (2011) who found that Wednesday had a statistically significant effect on the stock market returns in Bahrain and Qatar. The DOW effect was found to be statistically significant for Saudi Arabia, the UAE, and Turkey on Thursday based on both models.

The Friday effect was found for DJIM, Malaysia, Jakarta, the UAE, and Pakistan. On the last trading DOW, stock turnover is often smaller and price movements are less significant. Companies with bad news to report frequently use this gap to make their announcements on Fridays. It appears that the number of distracted investors is higher on Fridays than on other days due to people's attention on the forthcoming weekend. This finding represents a significant contribution of behavioral economics to financial theory. The idea that factors such as limited attention can affect stock prices and magnify post-earnings-announcement drift reinforces the point that financial models should incorporate psychological dynamics.

5.0 Conclusion and Recommendation

The Monday effect was present in the stock market returns for DJIM, Indonesia, Kuwait, and Pakistan. The Tuesday effect was present in DJIM, Malaysia, Indonesia, Kuwait, and Pakistan stock market returns. DJIM, Indonesia, Saudi Arabia, UAE, Qatar, Bahrain, and Pakistan were among the 10 stock markets that had a Wednesday effect. Saudi Arabia, the UAE, Qatar, and Turkey, all had a Thursday effect. Finally, DJIM, Malaysia, Indonesia, the UAE, and Pakistan experienced the Friday effect. This research has substantial implications for market participants such as portfolio managers, investors, market analysts, speculators, arbitrageurs, spreaders, and hedgers, particularly in assisting them with making better investment decisions. The findings of this study can be used by market participants in established and emerging markets to diversify their investments and manage their stock market positions and risks. The study also discovered that CA had a significant impact on the stock performance of Islamic stock market indices. Investors can earn abnormal returns by buying stocks on the day with the lowest significant coefficient in a week and selling stocks on the day with the greatest significant coefficient in a week due to the DOW impact. Furthermore, the bulk of these Islamic stock markets are not efficient, as investors can achieve abnormal returns by trading using a technique based on historical data. These findings have ramifications for investors looking for trading tactics to help fulfill their financial goals, as well as for investors seeking to diversify their portfolios so as to maximize return and minimize risk. The results also provide information to policymakers about the current state of Islamic stock markets.

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Paper Contribution to Related Field of Study

This paper contributes to the field of Islamic Finance and general finance.

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