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CHANGES TO THE TRADING CALENDAR AND THE DAY OF THE WEEK EFFECT IN RETURNS AND VOLATILITY OF THE SAUDI STOCK EXCHANGE

Abstract

Until June 29, 2013, the trading days of the Saudi Stock Exchange (TADAWUL) were from Sunday to Wednesday. From June 29, 2013, TADAWUL changed trading days and started trading from Sunday to Thursday. This paper investigates whether this change has impacted the day-of-the-week effect on returns and volatility of the Saudi Stock Exchange. After estimating several GARCH-type models, the EGARCH (2,2) model was selected for the analysis. The study found that the stock return on the week's first trading day (Saturday) was positive during the previous trading calendar.

In contrast, the current trading calendar observed a positive stock return on the last trading day of the week (Thursday). Further, a negative volatility exists at the end of the week during the previous trading calendar. At the beginning of the week, there is a high degree of positive volatility during the current trading calendar. These results indicate that the behavior of stock returns is different between the two trading calendar regimes. In addition, the behavioral patterns on other trading days suggest that the Saudi stock market does not conform to the weak form of the efficient market hypothesis. The above findings indicate that investors in the Saudi stock market could devise trading rules to predict the market index and earn abnormal returns consistently.

Keywords day of the week effect, TASI, TADAWUL, GARCH models, EGARCH model

JEL Classification G10, G14, G23

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INTRODUCTION

Al-Loughani and Chappell (2001), Ulussever et al. (2011), and Abalala and Sollis (2015) discovered that the Saturday return (the first trade day of the week) was highest in Gulf Cooperation Council (GCC) countries where the Islamic calendar is employed. This result contradicts the results from the United States and other countries (see, for example, Keim & Stambaugh, 1984; French, 1980; Cross, 1973). Because of this disparity in the results of the day-of-the-week effect (DOW) across different stock markets, it is vital to investigate the DOW of the Saudi Stock Exchange rather than generalizing prior research findings.

According to the TADAWUL Annual Statistical Report for 2016, TADAWUL is the largest stock market in the GCC, Middle East, and North Africa (MENA) regions. At the end of 2016, TADAWUL's total market capitalization was US$ 448.52 billion. The total value of shares traded was US$ 308.53 billion, the total number of transactions was 27.27 million, and the total number of shares traded was 67.73 billion. The companies listed on the TADAWUL are divided into 20 different industry categories. The Capital Market Authority, which is responsible for supervising the Saudi stock market, decided to change the trad-

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ing days from Saturday to Wednesday to Sunday to Thursday on June 29, 2013. However, the impact of changing the Saudi stock market's trading calendar has not received the attention of researchers.

This study examines if there is a significant difference in the DOW effect on the TADAWUL All Share Index (TASI) returns and volatility during the two trading calendar regimes.

1. LITERATURE REVIEW

The past literature has investigated several calendar anomalies. This section reviews the literature on calendar anomalies in Saudi Arabia and other countries.

1.1. Calendar anomalies around the globe

There is a plethora of studies on calendar anomalies, and most of these studies have used US stock market data. Cross (1973) examined the DOW effect on stock returns for the S&P 500 index from 1953 to 1970. This study found a significantly higher return on Fridays and a substantially lower return on Mondays compared to the other days of the week. French (1980) found similar results for the same market index over a more extended period. Gibbons and Hess (1981) supported these outcomes and studied the DOW effects on returns for the S&P 500 index from 1962 to 1987. This study found a negative return on Mondays for individual stocks and treasury bills. These studies support the DOW effects on stock returns on Fridays and Mondays

Many researchers have studied Friday and Monday effects on the stock market returns. Lakonishok and Levi (1982) argued that positive returns on Fridays and negative returns on Mondays occurred due to the non-trading days during the weekend between the close of the stock market on Friday and the opening of the stock market on Monday. Also, they contend that there would be significant positive returns on the last trading day before the holidays and significant negative returns on the first trading day after the holidays. Keim and Stambaugh (1984) investigated the weekend effect on stock market returns over a longer timeframe on a larger sample. They used daily returns for 30 industrial companies on the Dow Jones Index from 1928 to 1982. They found results consistent with previous studies. Another study by Rogalski (1984) investigated the weekend and Monday effect on the stock returns for the Dow Jones Industrial Average (DJIA) from 1974 to 1984. Rogalski showed that negative returns on average occurred during non-trading days and the average returns for all trading days are similar.

Lakonishok and Maberly (1990) studied the behaviors of individual and institutional investors concerning the DOW effects on the S&P index from 1962 to 1986. Similarly, Lakonishok and Maberly (1982) found that individual investors were more inclined to sell their stocks than buy new ones on Fridays, which caused positive returns. The above evidence confirms that Friday's positive and Monday's negative returns are caused by the weekend non-trading days.

Investigating the DOW effect on stock market returns for an international sample is another strategy to understand the causes behind negative returns on Mondays. Jaffe and Westerfield (1985) examined the DOW effect on stock returns for a sample from four developed stock markets (the UK, Japan, Canada, and Australia) from 1970 to 1983. They found that the DOW effects in each of the stock markets studied and the lowest mean returns were reported on Tuesdays for both the Japanese and Australian stock markets instead of Fridays, which had been reported for the US stock markets. These outcomes are supported by Aggarwal and Rivoli (1989), who examined seasonal effects in stock returns for four Asian stock markets (Hong Kong, Singapore, Malaysia, and the Philippines) from 1976 to 1988. They found negative returns on Monday in all markets and positive returns in January for all markets except for the Philippines. They also found negative returns on Tuesdays for the four Asian stock markets. This was due to the time gap between the trading time in New York and the trading time in these Asian markets. An extensive analysis and discussion of stock price changes and volatility were conducted by Hamao et al. (1990). They studied stock

price changes and volatility for a sample from the Tokyo, London, and New York stock markets from 1985 to 1988. They found that stock price volatility had indirect effects from New York towards both Tokyo and London and from London towards Tokyo. These international outcomes indicate that there are numerous similarities and connections between different stock markets around the world.

Several studies have researched the volatility of stock prices and stock returns using Autoregressive Conditional Heteroscedasticity (ARCH) and Generalised Autoregressive Conditional Heteroscedasticity (GARCH) models. French et al. (1987) studied the relationship between returns and volatility of the S&P 500 index from 1928 to 1984. They found a positive relationship between anticipated risk premiums and the predictable part of volatility and a negative relationship between the unpredictable part of volatility and unpredictable stock returns. Akira (1989) used ARCH and GARCH models to examine the behavior of a series of daily stock returns. They found that there were significant levels of dependence among daily stock returns. Another study by Baillie and DeGennaro (1990) examined the relationship between daily and monthly mean returns of a stock market portfolio from 1970 to 1987. Using a GARCH model, they found a weak relationship between the mean returns of the stock market portfolio and both the standard deviation and conditional variance. Campbell and Hentschel (1992) found a positive relationship between returns and stock market volatility and that increases in both stock returns and stock market volatility have a negative effect on stock prices. Campbell and Hentschel adjusted the GARCH model to test the volatility feedback impact on the US stock market from 1926 to 1988. In contrast to the results reported by French et al. (1987) and Glosten et al. (1993), they found a reverse relationship between positive unexpected stock returns and lower conditional volatility and negative unexpected stock returns with increasing conditional volatility.

Studies on seasonal effects have mainly focused on the impacts of holidays, trading, and non-trading days on stock returns and volatility. The January effect and holiday effect are examples of seasonal effects. The literature has highlighted several types of seasonal effects in a single country or an international sample. A study by Agrawal and Tandon (1994) investigated five varieties of seasonal effects using a sample of eighteen stock markets from 1971 to 1987. The five seasonal effects studied were the end-of-December, turn-of-the-month, Friday-the-thirteenth, weekend, and monthly effects. This sample covered eighteen stock markets on five continents and different economies. They compared the results of previous studies for the US with the results of this study. They found evidence of a Monday effect that supported the US market results in eight countries and the Tuesday effect in ten countries. They also found evidence of significant positive returns on Fridays for all stock markets studied except for one Stock Market. They found turn-of-the-month effects, January effects, inter-holiday effects in fourteen countries, and end-of-December and pre-holiday effects in eleven countries. They also found evidence for the monthly effect in most countries studied. The evidence presented in this study shows the differences and similarities between stock markets worldwide and the temporal effects that caused convergence and divergence in the results obtained.

Yakob et al. (2005) discovered different seasonal effects in stock market returns for the Asia Pacific countries from 2000 to 2005. The seasonal effects they studied were the DOW effect, month-of-the-year effect, monthly effect, and holiday effect. Using GARCH models, they found evidence for the DOW effect in Australia, China, India, Indonesia, and Taiwan and evidence for the month-of-the-year effect in Australia, China, Hong Kong, India, Indonesia, Malaysia, South Korea, and Taiwan. They also detected a monthly effect in Australia, India, Indonesia, Singapore, South Korea, and Taiwan and a holiday effect in Australia, Hong Kong, Japan, and Singapore.

There are few empirical studies on the seasonal effects of emerging economies such as African countries. A study by Mlambo and Biekpe (2006) examined the impact of many types of seasonal effects on stock market returns from seventeen African stock indices in nine African countries from 1997 to 2002. Using various tests, they found support for the Monday effect in Botswana and Morocco and the day-of-the-week effect in Egypt and Zimbabwe. The month-of-the-year effect

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was found in BRVM, Morocco, Tunisia, Ghana, Botswana, and Zimbabwe, and the January effect was found in Egypt, Tunisia, Zimbabwe, and Mauritius. The turn-of-the-month effect was found in Botswana, Egypt, and Mauritius, and the week-of-the-month effect was found in Egypt and BRVM. The turn-of-the-year effect was also found in Mauritius. These findings for seasonal effects in African countries emphasize the need to investigate seasonal effects on stock returns in countries like the Middle East and Gulf Co-operation Council (GCC).

The existing literature on the seasonal effects of stock returns in the GCC is limited, and most of these studies have focused on stock returns from one stock market. For example, Al-Saad and Moosa (2005) examined the seasonal effects of the Kuwait Stock Exchange. Their study focused on the monthly effects of the main index of the Kuwait Stock Exchange. They found support for the July effect instead of the January effect, and they identified that the reasons for it were the summer holiday effect and the weather during July in Kuwait. Another study by Al-Loughani et al. (2005) investigated the holiday effect in the Kuwait stock market. Their study divided the sample into two periods. The first period was the pre-liberation period from 1984 to 1990, and the second was the post-liberation period from 1993 to 2000. The results showed no positive stock returns pre-holidays and no positive stock returns post-holidays, like other studies around the world.

Markets in developed economies have a lot of similarities and connections with the US markets. Therefore, comparing the results of DOW effects in the US stock market with those in European stock markets is appropriate. Solnik and Bousquet (1990) investigated the DOW effect of the Paris stock market. They found a negative return on Tuesdays, which was consistent with the results for the Japanese and Australian stock markets. They also reported that the settlement procedures in these markets caused the Tuesday effect. They found that the Monday effect was similar to the US stock market experience after adjusting for the settlement procedure's influence. Alexakis and Xanthakis (1995) found negative returns on Tuesdays and positive returns on Mondays for the Greek stock market. Coutts et al. (2000) examined the DOW effect on the general index and financial sector index of the Athens Stock Exchange from 1986 to 1996. They found DOW effects on the general and bank indices but no DOW effects on the insurance or leasing indices. A further study by Davidson and Faff (1999) investigated DOW effects on the Australian stock market from 1983 to 1996 and found negative returns on Monday and Tuesday. In Turkey, Balaban (1995) studied DOW effects on the Istanbul Securities Exchange Composite Index (ISECI) from 1988 to 1994 and found negative returns on Tuesdays and positive returns on Fridays. Oguzsoy and Güven (2003) found negative returns on Tuesdays and positive returns on Fridays for the İstanbul Stock Exchange from 1988 to 1999. All these findings for developed countries indicate that the highest negative stock returns occurred on Tuesdays instead of Mondays in the US stock markets. Therefore, it is interesting to examine if the DOW effect exists on different days in other stock markets, such as Tadawul.

1.2. Calendar anomalies in the Saudi Stock Exchange (TADAWUL)

The Saudi Stock Exchange (TADAWUL) calendar anomalies are an essential topic of investigation due to their unique trading system. First, TADAWUL uses the Islamic calendar, which is different from the trading calendars used in most parts of the world, where they use the Western calendar. Second, trading is conducted according to Islamic holidays and practices. Third, as mentioned before, the trading days on TADAWUL changed from Saturday to Wednesday to Sunday to Thursday. This unique trading system does not exist in any other stock market. Only a few studies have investigated calendar anomalies of the TADAWUL. Seyyed et al. (2005) examined the seasonality effects in general, the Ramadan effect in stock returns, and the volatility of TADAWUL from 1985 to 2000. Ramadan is the ninth month of the Islamic year. All Muslims must fast every day of this month. Therefore, the capital market authority in Saudi Arabia reduces trading hours and halts trading in the stock market during the last ten days of this month before 'Eid al-Fitr,' which is one of two Islamic holidays. Trading resumes one week after 'Eid al-Fitr.' The above study documented a decline in stock returns and volatility

during all days of Ramadan (the 'Ramadan effect'). Another study by Ulussever et al. (2011) examined the DOW effects in the TADAWUL from 2001 to 2009. When this study was conducted, the trading days of the Saudi Stock Exchange during the sample period were from Saturday to Wednesday, with Thursday and Friday being weekend days. This study found that the DOW effect was evident in the Saudi Stock Exchange. Saturday's return (the first trading day of the week) was the highest compared to the returns of the other days of the week. This result is consistent with the results for the Kuwaiti market and contradicts the results for different markets. A recent study by Abalala and Sollis (2015) examined DOW effects on stock returns on the TADAWUL from 2007 to 2010. This study focused on the Saturday effect. Saturday is the first trading day of the week in the Islamic calendar. The trading days on the TADAWUL during the sample period of this study were Saturday to Wednesday, with Thursday and Friday being weekend days. This study found positive returns on Saturday, called the 'Saturday effect.' This Saturday effect is inconsistent with the results for other markets and is consistent with the previous results for Kuwait and Saudi Arabia markets.

TADAWUL is the largest stock market in the Gulf Co-operation Council (GCC) countries and the Middle East and North Africa (MENA) region. Despite the importance of the TADAWUL, a few researchers have studied the DOW effects of the TADAWUL. The empirical studies on the DOW effects in stock returns on the TADAWUL used data for the period when the trading days were from Saturday to Wednesday. No studies have thus far investigated the DOW effect in stock returns of the TADAWUL after the change in the trading days from Sunday to Thursday. Therefore, the current study aims to address this research gap by conducting the first empirical study comparing the DOW effect after the change of trading days of the TADAWUL to that before the change in trading days.

The above literature review suggests that previous researchers have not examined whether the returns and volatility of the TADAWUL index significantly differ between the two trading regimes mentioned above. This study examines this issue using daily data for the two trading regimes using the GARCH model.

2. DATA AND METHODOLOGY

2.1. Data

To explore the existence of the DOW effects on TADAWUL during the two trading regimes, the daily closing values of the TASI index were used. The daily closing values of the TASI index were obtained from the TADAWUL website (www.tadawul.com.sa). The sample period of the study is from 29/6/2009 to 29/6/2017 (1,994 observations). This period has been selected for two reasons. First, to cover as many observations as possible after and before the trading calendar was changed on June 29, 2013. Secondly, this period has not been covered by the previous studies on DOW effects on TADAWUL. The first sub-period from 29/6/2009 to 28/6/2013 has 998 observations, and the second sub-period from 30/6/2013 to 29/6/2017 has 996 observations.

2.2. Methodology

This study estimated different versions of the GACH model using the log returns of TADAWUL to select the best-fitting model. The Akaike information criterion (AIC) showed that the best model was the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model.

The following model was estimated as the mean model:

$$R_t = \propto_0 + \sum_{t=1}^{5} \propto_t D_t + \propto_6 R_{t-1} + \varepsilon_t, \quad (1)$$

where R_t is the natural logarithm of the return on day t, D_1 *to* D_4 are dummy variables from Sunday to Wednesday. D_5 is a dummy variable that takes a value of 1 for the days during the current trading regime and 0 for the days during the previous trading regime. $\alpha_{0\ to}\ \alpha_6$ are the parameters to be estimated, $R_{t\text{-}1}$ is one period lagged return, and ε_t is the error term.

Based on the results of AIC, the following EGARCH model was used for both sample periods in this study:

$$\sigma_t^2 = \alpha_0 + \sum_{t=1}^{5} \propto_t D_t + \propto_6 R_{t-1} + \\ + \propto_7 \sigma_{t-1}^2 + \propto_8 \varepsilon_{t-1}^2 + \varepsilon_t, \quad (2)$$

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where σ_t^2 is the conditional variance of the error term from equation 1, the dummy variables, ε_{t-1}^2 and R_{t-1}, are defined as above. $\alpha_{0\ to}\ \alpha_6$ are the parameters to be estimated. σ_{t-1}^2 is the previous day's conditional variance.

3. RESULTS AND DISCUSSION

3.1. Test results for heteroscedasticity

To test for the heteroscedasticity of the daily returns, a heteroscedasticity test (ARCH) was used. The null hypothesis is that the daily returns exhibit homoscedasticity. The alternative hypothesis is that daily returns show heteroscedasticity.

Table 1. Test results for heteroscedasticity in returns

	Lags 1	Lags 5	Lags 10	Lags 15	Lags 20
Chi-Square statistic	127.3325	325.4350	334.2280	339.9658	344.0609
P-value	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***

Note: *** statistical significance at the 1% level.

The results of the heteroscedasticity test in Table 1 reject the null hypothesis that daily returns are homoscedastic. This confirms that the daily returns exhibit heteroscedasticity. Therefore, the GARCH model is appropriate to analyse the data in this study.

3.2. Model selection

Selecting the most appropriate model from the available GARCH models is crucial to obtaining valid and reliable results. Table 2 compares many GARCH family models to find the best-fitting model for the data. After estimating many GARCH models, the exponential generalized autoregressive conditional heteroskedastic or EGARCH (2, 2) model with Student's error distribution was chosen to model the daily returns. This model had the lowest AIC out of all the models estimated.

According to Table 2, the EGARCH (2,2) model has the lowest AIC value. The study estimated many models for the two sub-sample periods to select the best models. The EGARCH (2,2) model also had the lowest AIC values for the two sub-sample periods. Therefore, this model was estimated for the two sub-sample periods as well. The models estimated found a significant difference between the day-of-the-week effect of the Saudi Stock Market between the two sub-sample periods.

3.3. Empirical results

Investigating the day-of-the-week effects on the returns and volatility of the TASI due to the

Table 2. Selecting the model with the best fit

Model	ARCH	SEARCH	Error Distribution	AIC
GARCH/TARCH	1	1	Normal (Gaussian)	-6.511109
GARCH/TARCH	1	1	Student's t	-6.695948
GARCH/TARCH	2	1	Normal (Gaussian)	-6.518201
GARCH/TARCH	2	1	Student's t	-6.700407
GARCH/TARCH	1	2	Normal (Gaussian)	-5.828208
GARCH/TARCH	1	2	Student's t	-6.709855
GARCH/TARCH	2	2	Normal (Gaussian)	-6.56136
GARCH/TARCH	2	2	Student's t	-6.718679
EGARCH	1	1	Normal (Gaussian)	-6.484733
EGARCH	1	1	Student's t	-6.702821
EGARCH	2	1	Normal (Gaussian)	-6.425482
EGARCH	2	1	Student's t	-6.707478
EGARCH	1	2	Normal (Gaussian)	-6.556242
EGARCH	1	2	Student's t	-6.724054
EGARCH	2	2	Normal (Gaussian)	-6.584676
EGARCH	2	2	Student's t	-6.753091
PARCH	1	1	Normal (Gaussian)	-6.520637
PARCH	2	1	Normal (Gaussian)	-6.521973
PARCH	1	2	Normal (Gaussian)	-5.827205
PARCH	2	2	Normal (Gaussian)	-6.567626

change in trading days in the Saudi stock market is important to establish whether this change has a significant impact on stock returns and volatility. Therefore, the study performed the analysis using the selected model, the EGARCH model, for the whole sample period and two sub-sample periods. The first sub-sample period is the period before the trading days were changed. The second sub-period is the period after the trading days were changed. Table 3 (Panel A: Mean Equation) shows that the day-of-the-week effect exists and is significant at the 1% level for all trading days in the whole sample.

There is a significant positive index return on Saturday with a coefficient of 0.003173 (p-value 0.0000). This was the first trading day before the trading days were changed. On the other

Table 3. EGARCH (2, 2) mean and variance equation

Independent Variable	Whole Sample	Sub-sample Period 1	Sub-sample period 2
Panel A: Mean Equation			
SATURDAY	0.003173***	0.003063***	
	(0.0000)	(0.0001)	
SUNDAY	–0.002955***	–0.003247***	0.000565
	(0.0000)	(0.0000)	(0.41990
MONDAY	–0.003739***	–0.003494***	–0.001985***
	(0.0000)	(0.0000)	(0.0020)
TUESDAY	–0.003546***	–0.003726***	–0.000905
	(0.0000)	(0.0000)	(0.1698)
WEDNESDAY	–0.00242***	–0.002239***	–0.00034
	(0.0004)	(0.0033)	(0.5673)
THURSDAY	–0.002208***		0.001057***
	(0.0066)		(0.0076)
PREVIOUS_CURRENT	3.07E–05		
	(0.9290)		
Panel B: Variance Equation			
α_1 (ARCH 1)	0.252909***	0.2730***	0.364246***
	(0.0000)	(0.0000)	(0.0000)
α_2 (ARCH 2)	0.178225***	0.265434***	0.285057***
	(0.0008)	(0.0000)	(0.0000)
β_1 (GARCH 1)	–0.075528**	–0.10101**	–0.173509***
	(0.0369)	(0.0128)	(0.0000)
β_2 (GARCH 2)	–0.130995***	–0.142595***	–0.131544***
	(0.0002)	(0.0003)	(0.0000)
Υ_1	0.238305***	–0.003188	–0.053347***
	(0.0062)	(0.9409)	(0.0000)
Υ_2	0.676004***	0.84241***	0.930346***
	(0.0000)	(0.0000)	(0.0000)
φ (SATURDAY)	–0.340406	–1.431191***	
	(0.1543)	(0.0016)	
φ (SUNDAY)	–0.877744***	–0.819185***	1.019276***
	(0.0000)	(0.0001)	(0.0000)
φ (MONDAY)	–1.186054***	–1.173662***	0.955497***
	(0.0000)	(0.0000)	(0.0000)
φ (TUESDAY)	–0.840346***	0.081984	0.194363
	(0.0000)	(0.7739)	(0.3337)
φ (WEDNESDAY)	–1.177359***	–0.813892***	0.39058***
	(0.0000)	(0.0004)	(0.0045)
φ (THURSDAY)	–1.853573***		–2.163679***
	(0.0000)		(0.0000)
φ (P_C)	0.416591***		
	(0.0000)		

Note: *Significance at 10%, **significance at 5%, and ***significance at 1%.

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hand, there are significant negative returns on different trading days (Sunday, Monday, Tuesday, Wednesday, and Thursday) for the whole sample period with a coefficient of –0.002955 (p-value 0.0000), –0.003739 (p-value 0.0000), –0.003546 (p-value 0.0000), –0.00242 (p-value 0.0004), and –0.002208 (p-value 0.0066), respectively. Meanwhile, the dummy variable used for the days after the change in trading days is not significant at any level, which means that there is no statistically significant difference between the sample periods. Like the results for the whole sample period, day-of-the-week effects are significant among all days before the change to the trading day calendar at the one per cent level. There is a significant positive index return on Saturday, which is the first trading day during the period before the change to trading days, which is statistically significant at the one per cent level. On the other hand, there are significant negative returns on the other trading days (Sunday, Monday, Tuesday, and Wednesday), which are statistically significant at the one per cent level. In contrast, the day-of-the-week effect exists in the mean returns only on two trading days, Monday, and Thursday, after the change to trading days. The mean return on Thursday, the last trading day, is positive, while the mean return on Monday is negative. The mean returns on Sunday, Tuesday, and Wednesday are not significant at any level during the period after the change to trading days.

According to Panel B of Table 3, the volatility of the stock returns is significant at the one per cent level on all trading days for the three sample periods. The two ARCH terms show significant positive volatility of stock returns in all periods, which indicates that the previous and current variances are positively related. The two GARCH terms show significant negative volatilities of stock returns in all periods, which suggests a leverage effect. The leverage effect means that the reaction of the volatility of stock returns is affected to a greater extent by bad news than good news. This is also an indicator of the moving speed and trend in variance over time.

For the whole sample, the volatility of stock returns is significant at the one per cent level on all trading days except on Saturday, which is not significant at any level. There is a significant negative volatility in stock returns on the other trading days (Sunday, Monday, Tuesday, Wednesday, and Thursday) with a coefficient of –0.877744 (p-value 0.0000), –1.186054 (p-value 0.0000), –0.840346 (p-value 0.0000), –1.177359 (p-value 0.0000), and –1.853573 (p-value 0.0000), respectively. The dummy variables are positive and significant at the one per cent level with a coefficient of 0.416591 (p-value 0.0000). The volatility of stock returns is significant at the one per cent level on all trading days except on Tuesday, which is not significant for the previous trading days. There is significant negative volatility in stock returns on the other trading days (Saturday, Sunday, Monday, and Wednesday). Like the results of the first sample period, the results for the second sample period show significant volatility of stock returns at the one per cent level on all trading days except Tuesday, which is not significant at any level. There is significant positive volatility in stock returns on some trading days (Sunday, Monday, and Wednesday), while there is significant negative volatility in stock returns on Thursday.

This study found evidence of significant positive stock returns on the first day of the week (Saturday) for both the whole and the first sample period. Saturday is not a trading day in the second sample period. This outcome of significant positive stock returns on Saturday (the first trading day of the week) is similar to the findings of previous studies by Al-Loughani and Chappell (2001), Ulussever et al. (2011), and Abalala and Sollis (2015). They reported consistent results in similar stock markets in the GCC region. The finding of positive stock returns on the first day of the week on GCC stock markets is not consistent with the findings for the US stock market, where negative stock returns have been reported on the first day of the week. This difference in results between GCC stock markets and US stock markets is affected by differences in investors' behavior and trading procedures in each market. The study found evidence of significant positive stock returns on the last day of the week (Thursday) for the second sample period only. In contrast, this day is associated with negative stock returns in the whole sample and is not a trading day in the first sample period. The finding of a positive stock return on Thursday (the last trading day of the week) is consistent with the results of previous studies by Cross (1973), French (1980), Gibbons and Hess (1981), Lakonishok and Levi (1982),

Keim and Stambaugh (1984), Rogalski (1984), and Lakonishok and Maberly (1990). They find positive stock returns in the US stock market on Friday, the last trading day of the week. The positive stock return on the last day of the week in the second sample period is consistent with the results for the US stock market.

The study found that volatility is significant on all trading days in all three sample periods. The leverage effect is also evident in TASI returns and the variance of all periods. By comparing the three-time periods, negative volatility is evident on most trading days for both the whole sample and the first sample period. In contrast, positive volatility exists on most trading days for the current trading period due to the new resolutions applied to minimize the volatility of stock returns. Volatility is highest on the last day of the week for the whole sample and the second sample period, whereas volatility is highest on the first day of the week for the first sample period. The findings of this paper show that the returns and volatility of the TASI index vary on the different trading days of the week and between the previous and current trading calendar regimes.

CONCLUSION

The trading days of the Saudi stock market were from Sunday to Wednesday before 29 June 2013. After the above date, the Saudi stock market started trading from Sunday to Thursday. This study aimed to examine if the above change resulted in a significant difference to the day of the week effect of the Saudi stock exchange. After testing many GARCH-type models, the EGARCH (2,2) model was selected as the best model. This model revealed that the returns and volatility of the TASI index varied among trading days and between the previous and current trading calendars. Like other stock markets in the GCC region, the TASI index recorded significant positive stock returns on the first day of the week (Saturday) for both the whole sample and the previous trading calendar. On the other hand, the TASI index recorded significant positive stock returns on the last day of the week (Thursday) for the current trading calendar only. This result is consistent with the results of the US stock market that revealed positive stock returns on Fridays (the last trading day of the week). The current study also found that volatility is present and significant on all trading days. This result is common to all three time periods. In addition, the analysis revealed a leverage effect in the TASI index returns. At the end of the week, there is high negative volatility for both the whole sample and the first sample period. In contrast, at the beginning of the week, there was high positive volatility during the second sample period. This result could be due to the changes in regulation by the government and stock market authorities, which can indirectly impact stock returns and volatility on the stock market. Further, the day of the week in the Saudi market is significantly different before and after the change to the trading days. The above results violate the weak form of the efficient market hypothesis. Therefore, investors in the Saudi stock market can use trading rules to predict returns and earn abnormal returns.

AUTHOR CONTRIBUTIONS

Conceptualization: Guneratne Wickremasinghe.
Data curation: Abdulelah Alsayari.
Formal analysis: Abdulelah Alsayari.
Investigation: Abdulelah Alsayari, Guneratne Wickremasinghe.
Methodology: Guneratne Wickremasinghe.
Project administration: Guneratne Wickremasinghe.
Supervision: Guneratne Wickremasinghe.
Validation: Guneratne Wickremasinghe.
Visualization: Abdulelah Alsayari.
Writing – original draft: Abdulelah Alsayari.
Writing – review & editing: Guneratne Wickremasinghe.

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