The Day of the week effect on Amman Stock exchange market (2008-2010)

Ohoud Khasawneh(Corresponding author)
Department of Finance and Banking, Al-Ahliyya Amman University,Jordan
E-mail:Okhasawneh@ammanu.edu.jo

Razan Salem
Department of Finance and Banking, Al-Ahliyya Amman University,Jordan
E-mail:Rsalem @ammanu.edu.jo

Thair Al Shaher
Department of Finance and Banking, Al-Ahliyya Amman University,Jordan
E-mail:Talshaher @ammanu.edu.jo

Abstract

The day of the week effect in stock market returns is considered one of the puzzling anomalies in finance that has captured the attention of investors, professional, and academics through the years. The day of the week effect, which illustrates that the average return on one day of the week is significantly less than average return of other day of the week, has been investigated heavily in various developed and emerging stock markets.

The purpose of this paper is to empirically investigate the presence of the day of the week effect in the emerging stock market of Jordan, Amman Stock Exchange (ASE); in both return and volatility equations. In the study, we apply the EGARCH framework to analyze the daily closing prices of the major index of Amman stock exchange (ASE) from January 2, 2008 to December 31, 2010.

The findings of the study reveal that the day of the week effect anomaly (in both return and volatility equations) is present in Amman Stock Exchange. The highest returns observed on Sunday and the lowest returns observed on Monday. According to our findings, we conclude by advising investors willing to invest in Amman stock exchange to buy on Monday and sell on Sunday to capture the returns that satisfy their demands and needs.

Key words: day of the week, volatility, EGARCH, emerging market, ASE, Jordan.

1. Introduction

Through the years, there have been many studies that have documented the existence of certain tradable financial anomalies in the stock markets. These financial anomalies, which refer to the unexplained results under financial theory, contradict the efficient market theory, where security prices fully reflect all available information at any time for specific stock or/and market. Since these anomalies tend to affect stocks' returns and volatilities, they have captured the attentions of many investors around the world. Investors should always be aware that these anomalies can suddenly appear and disappear without any warning and as a result can affect the stocks' returns.

Some of these anomalies are known as calendar effects, containing (the day of the week effect, the January effect, the trading month effect, the weekend effect, and the holiday effect). Calendar anomalies are mainly based on the assumption that specific pattern of stock markets is formed based on that historical prices can predict future stock prices (liu and Li, (2010)).

The day-of-week-effect, which considered one of the most common calendar effects, has been examined and evaluated in many stock markets, mainly developed markets. The –day- of-the –week effect, which indicates that the average return on one day of the week is significantly less than average return of other day of the week ((cross (1973); French (1980), Keim and Stambaugh (1984)) has been rejected by the supporters of efficient market theory.

For decades, many researchers have proven that stock market generally tend to drop Monday and gain Friday. The impact of weekends on Monday is the most obvious.

According to the fundamental level, there is no reason this should be true always. On the contrary, according to technical level this might occurs since it predicts future prices based on historical prices and investor sentiment. According to finance behavior, various psychological factors play major role in the day of the week effect phenomenon, where investors' emotions and feelings can influence their investment decisions and therefore influence prices and returns in stock markets. Generally, on the weekend, investors have more chance to read and analyze more on stocks, and therefore the unfavorable news that might occur during the weekend can negatively affect investors. As a result, investors develop pessimism toward Monday and start selling their stocks on the first day of the trading week. On the contrary, investors become optimistic toward Friday and the weekend. Hence, stocks tend to move more positively on Friday than Monday. Accordingly, investors who are interested in buying stocks should buy on Monday rather than any other trading day.

The above explanation is not necessarily applied to all stock markets. The day of the week effect on particular stock market is influenced by the behavior of the investors trading in this market, which might vary from the behavior of other investors. In general, the psychology of investors toward investment decisions is linked to investors' emotions and way of thinking. Therefore, the day of the week effect might vary among stock markets.

This paper investigates the day of the week effect in Amman stock exchange (ASE) in both return and volatility equations, which considered an emerging economy. It also examines the trading pattern of the investors trading in this market related to the day of the week. Finally, it gives recommendation to investors how to benefit from the day of the week effect anomaly in Amman stock exchange.

This paper is conducted as follows: the first section gives general view about the day of the week effect in stock returns. The second section reviews briefly the previous studies conducted on the day of the week effect in different developed and emerging markets. The third section outlines the methodology by describing the sample, data selection, and hypothesis. The fourth section analyzes and explains results. In the final section, the paper summarizes the study's findings and gives recommendations.

2. Previous studies

Calendar anomalies in stock market returns have been widely studied and documented in finance literature. Many existing studies about the day-of-the- week effect on stock returns concentrate on developed markets, as USA, with few studies focusing on developing markets. Currently, several studies have started focusing on emerging countries, as Middle East. The following is a summary of some of these studies and their results:

In their Study, (Ulussever, Guranyumusak, and Kar (2011)) studied the day of the week effect in the emerging stock market of Saudi Arabia (TADAWUL). They applied a non-linear GARCH model to cover data from January 2001 to December 2009. The findings indicated that the five trading days' returns follow different patterns, which confirms the day of the week effect in TADAWAl.

(Prokop, (2010)) examined the presence of the anomaly the day-of-the week-effect in German and U.S.A. stock

market returns over the past decade. During the first part of study, the empirical findings indicated a strong Monday effect. Through the time the effect faded and was missed after the year 2000. The study also concluded that the results for German and U.S.A. differ, meaning no general market behavior to the day-of-week-effect phenomenon.

(Kenourgios and Samitas (2008)) used a conditional variance framework to investigate the day-of-week-effect on return and volatility for the major Athens stock exchange for period 2001-2005. The findings demonstrated the presence of this phenomenon for emerging Athens stock exchange in both return and volatility equations.

In his study, (Al- Mutairi,(2010)) evaluated the day of the week effect anomaly in Kuwait Stock Exchange from January 2002 to August 2007. The author used GARCH framework to analyze the daily market index returns for the covered period. The results indicated that the positive returns are mainly on Saturday. Saturday returns are the highest returns than the rest of the trading days, except Wednesday. Therefore, the first day and the last day of trading have highest returns. The results also showed that the bad news have greater effects on market returns than good news.

(Nud, (2006)) investigated the annual returns, daily returns, and volatility of returns in 15 different developed and emerging European financial markets; using parametric and non-parametric tests from 1997-2004. The results showed that the day of the week effect was presence during 1997-2004. Seven of the European financial markets had negative returns on Monday, and seven also experienced negative returns on Wednesday. The study also revealed that there was high volatility of returns in the European markets.

In their study, (Syed and Perry, (2006)) investigated the day-of-the-week effect in twenty-one emerging markets, using both unconditional and conditional risk analysis. The results showed that the day-of-week-effects are mainly existent for Pakistan, Philippines, and Taiwan even after adjusting for market risk.

(Apolinario, Santana, Sales, and Caro (2006)) studied and analyzed the day-of-the-week effect on the main European stock markets, using GARCH and T-ARCH models. The results indicated the followings: first, the abnormal behaviors in these stock markets' returns are not present. Second, the day-of-the-week-effect is present in the volatility of main European stock markets, by applying the symmetric and asymmetric models.

(Aly, Mehdian, and Perry (2004)) investigated the presence of the day of the week effect in the Egyptian stock market using the Capital Market Authority Index (CMA). The findings showed positive and significant on average returns on Monday, but not significantly different from returns of the rest of the trading days. However, no proof was uncovered to support any daily seasonal patterns in CMA, indicating the returns are consistent with weak form market efficiency.

(Berument and Kiymaz (2001)) studied the development of the day-of-the-week-effect on U.S. stock market volatility using the SP 500 index from 1973-1997. Their findings indicated the presence of this anomaly in both return and volatility equations. The highest and lowest returns were obtained on Wednesday and Monday. On the contrary, the highest and lowest volatility were obtained on Friday and Wednesday respectively.

Based on the above previous studies, we can conclude that day-of-the-week effect phenomenon has been obtained in various developed and emerging markets, in both return and volatility equations. Generally, there are no in-depth studies on the day-of-week-effect anomaly in different Middle Eastern stock markets, as Jordan.

3. Methodology

This paper aims to investigate the day of the week effect in an emerging market, in particular the Amman Stock exchange (ASE) and how investors can benefit from this phenomenon to increase their return. This phenomenon of securities' volatility has important implications for security pricing and risk management.

In fact studies on such stock market anomalies started since the late 1920' where (Kelly (1930)) revealed the existence of the Monday effect on the U.S. market where the returns turned out to be negative.

In our study, we use both the return and volatility equations to obtain a more precise picture of stock market behavior, we apply different models; asymmetric ARCH model (EGRACH) and ordinary least square model (OLS).[1]

3.1 Hypothesis

H_0: There is no difference in the returns across the day's week

$$B_1= B_2= B_3= B_4= B_5$$

3.2 Data

We examine the daily closing prices of Amman market index (ASE) from January 2, 2008 to December 31, 2010, using approximately 740 observations. The trading in ASE starts from Sunday to Thursday (five trading days). We exclude the daily closing prices of year 2011 due the high political uncertainty the Middle East region has been going through, which affects the economy of the whole region including Jordan.

3.3 The Model

We carried out a regression model similar to (Miralles and Miralles (2000)), where they included five dummy variables one for each day of the week.

$$R_{it} = \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \beta_5 D_{5t} + e_{it} \quad \ldots\ldots 1$$

Where:

R_{it}**:** The daily stock return for ASE is calculated as follows: -

$$R_{it} = \ln (P_t / P_{t-1}) * 100 \quad \ldots\ldots 2$$

Where: -

P t : is the value of the index at date t.

P t-1: is the value of the index the previous working day.

D1t, D2t, D3t, D4t, and D5t are the dummy variables for Sunday, Monday, Tuesday, Wednesday and Thursday respectively.

We could have used Ordinary Least Square methods (OLS) applied in many literatures for calculating the stock returns. Most time series contain two drawbacks (1) the residuals obtain from the regression model can be auto correlated, (2) variance of the residuals are not constant. In order to correct the model from first drawback, we use lagged observations of the return. However if the second problem appears, one of The Arch family models (EGARCH) is proposed in order to correct the variability in the variance of the residuals.

3.4 Amman Stock Exchange

Jordan is important due to its unique and strategically geometric location; situated at the convergence of Europe, Asia and Africa. It is also considered a transportation hub of the Middle East in which has access to the Red Sea through the port of Aqaba, and other ports via neighboring countries

Its exclusive geographic location, stable political environment, and its free liberated market economy have encouraged many local and foreign investors, mainly from the region, to invest in its stock exchange, Amman Stock Exchange (ASE). According to the International report on Doing Business, Jordan ranked the 5th among countries in the MENA region for doing business.

The Amman Stock Exchange (ASE) was established in March 1999 as non-profit institution. Through the years, ASE has witnessed rapid developments in its market capitalization and net-income. It is one of the leading capital markets in the Middle East, since it started operations in 1978. Generally, the performance of (ASE) is greatly attributed to the major reforms that were implemented in the 1990s.

The (ASE) is one of the biggest stock markets in the region that encourages and allows foreign investment. Therefore, the (ASE) foreign investors hold majority of their stakes in all sectors except constructions, mining and commercial services companies. By the end of June 2011, the ownership of non-Jordanian investors reached 50.3% per cent of the (ASE) market capitalization (34.3 percent owned by Arab investors and 11.2 per cent owned by non-Arabs)[2].

The (ASE) statistics for the year 2008 showed that the (ASE) price index weighted by free float shares decreased by 24.9% reaching 2758 points, compared with 3675 points at the end of 2007. As for the price index weighted by market capitalization; it closed in 2008 with 6243 points, a 17% decrease than the 7519 points compare to the end of 2007. Despite the decline in the share prices during 2008; the (ASE) was less affected by the global financial crisis compared to other Arab and international exchanges.

During 2010, the trading value reached JD6.7 billion compared to JD9.7 billion for 2009. The (ASE) price index, weighted by free float shares, closed at 2374 points with a decrease of 6.3% compared with the closing of 2009 that stood at 2534 points. However, the non-Jordanian ownership as a percentage of market capitalization of the (ASE) has increased to 49.6% at the end of the year 2010, compared with 48.9% at the end of the year 2009. This indicated that these foreign investors mainly from the Gulf have confidence in ASE performance; therefore they invest heavily in this market. Since most of the foreign investors in the ASE are from Gulf, which they have similar culture and background as Jordanian investors, therefore their psychology toward investing are also similar.

4. The Results

According to the result of OLS (table (1)), we find that Monday has the lowest return (-0.223198). The significant negative Monday return highlights the presence of day effect. On the other hand, Sunday has the highest return (0.127848) among the trading days. We exclude the constant term to avoid the dummy variables trap for the equation.

Insert here table (1) the OLS results

To determine if variance of the residuals is not constant, we use Jarque-Bera test. Using this test, we find it significant at level 1%[3]. Meaning the standardized residuals is not normally distributed, so we rejected homoscedasticity. Therefore, we apply one of the Arch family models in order to correct the variability in the variance.

(Rabemananjara and Zakoian (1993)) emphasized on using EGARCH model from this family due to its major advantage for testing asymmetries, which is often observed in many financial markets. The downward movement of

the financial markets is followed by higher volatilities than upward movement of the same magnitude, so it is important to test asymmetric shocks to volatility in Amman Stock Exchange (ASE).

This model was developed by (Nelson, (1991)), where the variance in this model written as a natural logarithm Exponential GARCH model. The specification for the Conditional variance is[4] :-

$$\textbf{Log } \sigma_t^2 = w + \beta \log \sigma_{t-1}^2 + \sigma \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \gamma \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \quad \textbf{.....3}$$

Where:-

σ_t^2 **:-**is the one-period ahead forecast variance based on past information, it is called the conditional variance

W:-constant term.

ε_{t-1} :-News about volatility from the previous period, measured as the lag of the squared residual from the mean equation.

σ_{t-1} :- Last period's forecast variance.

γ: The leverage effect term

According to the result of EGARCH (table (2)), the highest return is observed on Sunday (0.135899), and Thursday (0.122437) respectively. Market index moves from upwards to downwards then ends up upwards (all variables are statistically significant at 1%). Hence, the lowest return is observed on Monday (-0.152751).

The leverage effect term γ (represented by c (8) in the output) is negative but statically not significant. In our results, a asymmetric [5] effect doesn't appear to be presence. Hence, the bad and good news have the same effect on market returns volatility during our sample period. It has been observed that the average market returns in the second, third, and fourth trading days are respectively negative than the rest of the trading days.

Insert here table (2) the result of EGARCH

Empirical results show that Exponential GARCH model can adequately describe the stock behaviors of the (ASE). Moreover, the model has Akaike info criterion (AIC) equal to 2.72787, which means the model describes reality [6].

4.1 The Result dissuasion

In general, Jordanian investors as any other investor around the world, act irrational when it comes to investing. According to behavior finance theory, the influence of investors' psychology and emotions can affect their behaviors toward investment decisions. Therefore, this theory that contradicts the efficient market theory explains the stock

market anomalies, as the-day-of-the-week effect [7].

Based on our results, Sunday the first trading day of the week has the highest returns; followed by Thursday the last trading day respectively. These results can be due to the following explanations: first, Jordanian investors are usually optimistic the first day of trading, due to their emotions and beliefs that the good news might be occurring on the weekend can positively influence the first day of trading. This explanation contradicts the behavior of other global investors, as U.S. investors, who believe that bad news occurring on the weekend cause negative returns in the first trading days. This demonstrates that investors act differently according to their emotions and beliefs.

Second, since there is high correlation between Amman Stock Exchange and Saudi Stock Exchange, then both exchanges mostly move together (Salem et al, (2011)). Therefore, Saturday, the first trading day in Saudi market has positive returns, therefore Sunday, the first trading day in (ASE), also has the highest returns. In Addition, Wednesday the last trading day in Saudi Stock Exchange has positive returns (Ulussever, Guranyumusak, and Kar (2011)).ASE as well, has positive returns on Wednesday due to the positive correlation between the two stock markets. Third, since 50% of non Jordanian investors are from gulf, mainly Saudis, therefore they invest heavily on Sunday and cause prices to increase. As Jordanian investors, Gulf investors generally feel optimistic toward the first day of trading.

On the other hand, Monday, the second trading days, has the lowest returns with highest volatility due to the followings reasons: First, Jordanian investors, generally are risk averse with small capital so they do not like to lose money. Therefore, they sell quickly to capture their profits and protect themselves from negative returns. In general after the panic of 2008 financial crises and the collapse of Lehman Brothers, many investors including Jordanian investors sell quickly to avoid risk.[8].

Second, most of Jordanian investors are not professional investors with very limited investment skills, hence they sell when they capture small gains. Third, Jordanian investors want to get rick quickly, where they act as speculators rather than investors, that why they sell immediately to gain small profits and eventually get rich from speculating. This kind of strategies used in (ASE), cause Monday to have the lowest returns with highest volatility [9]. Lastly, bad news of the weekend affecting U.S.A. stock market influence negatively Monday's returns. Therefore Amman Stock exchange (ASE) has lowest returns due to the high positive correlation between USA and Jordan, both market changes in the same direction (Salem et al, (2011)).

The bad news effect stay two days in the market, then the market again upward. Negative significant Monday return highlights the presence of day effect.

5. Conclusions

The day of the week effect has been one of the most important financial anomalies that attracted the interest of academic, economists, financial market analysts, and investors through the decades. Thus, there have been many studies documented this phenomenon in various stock markets around the world.

This paper studies the presence of the day of the week effect on both return and volatility for the Amman Stock Exchange (ASE) major index. For the purpose of the study, the EGARCH framework is used to analyze the daily closing prices of ASE index from January 2, 2008 till December 31, 2010.

The results imply the existence of the day of the week effect in ASE in both return and volatility equations over the study period. The highest positive returns are observed on Sunday, the first trading day, followed by Thursday (the last trading day). On the contrary, the lowest positive returns are examined on Monday, Tuesday, and Wednesday respectively. These findings contradict the findings of many studies done on various stock markets, which indicate the negative returns observed usually on the first trading day.

Based on our empirical results, we advise investors intending to invest in ASE to adjust their buying and selling strategies by trying their utmost to buy heavily on Monday and sell Sunday to capture their desired profits. When investing, investors should keep attention to the volatility of ASE. Generally, ASE suffers from inefficiency like

many other emerging stock markets. Therefore; further research must be done with wider range of data and by dividing the study periods to sub long period, to investigate better the permanent existence of this phenomenon based on individual securities.

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Table (1) OLS results

Dependent Variable: RETURN
Method: Least Squares
Date: 10/03/11 Time: 08:26
Sample (adjusted): 2 742
Included observations: 741 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SUN	0.127848	0.094421	1.354025	0.1761
MON	-0.223198	0.094107	-2.371737	0.0180
TUES	-0.148268	0.093797	-1.580727	0.1144
WENS	-0.166770	0.094421	-1.766242	0.0778
THURS	0.115657	0.098440	1.174898	0.2404

R-squared	0.016452	Mean dependent var	-0.062236
Adjusted R-squared	0.011106	S.D. dependent var	1.162888
S.E. of regression	1.156412	Akaike info criterion	3.135247
Sum squared resid	984.2450	Schwarz criterion	3.166340
Log likelihood	-1156.609	Durbin-Watson stat	1.415781

Table (2) the result of EGARCH

Dependent Variable: RETURN
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 10/03/11 Time: 08:03
Sample (adjusted): 2 742
Included observations: 741 after adjustments
Convergence achieved after 27 iterations
Variance backcast: ON
LOG(GARCH) = C(6) + C(7)*ABS(RESID(-1)/@SQRT(GARCH(-1))) + C(8)*RESID(-1)/@SQRT(GARCH(-1)) + C(9)*LOG(GARCH(-1))

	Coefficient	Std. Error	z-Statistic	Prob.
SUN	0.136373	0.056641	2.407689	0.0161
MON	-0.152373	0.065520	-2.325586	0.0200
TUES	-0.087419	0.054152	-1.614324	0.1065
WENS	-0.045896	0.070045	-0.655241	0.5123
THURS	0.121144	0.067443	1.796238	0.0725
Variance Equation				
C(6)	-0.209034	0.033715	-6.200001	0.0000
C(7)	0.254606	0.043208	5.892585	0.0000
C(8)	-0.022300	0.020819	-1.071110	0.2841
C(9)	0.973367	0.012177	79.93303	0.0000

R-squared	0.012927	Mean dependent var	-0.062236
Adjusted R-squared	0.002140	S.D. dependent var	1.162888
S.E. of regression	1.161643	Akaike info criterion	2.722417
Sum squared resid	987.7718	Schwarz criterion	2.778384
Log likelihood	-999.6554	Durbin-Watson stat	1.413344

Notes

[1] The OLS model estimates the day of the week effect in return equation

[2] http://www.exchange.jo./en/foreign-investment-activity

[3] The results of the Jarque-Bera test not included

4 http://www.eviews.com/

[5] Asymmetry term assesses whether negative shocks increase volatility more than positive shocks do.

[6] www. wikipedia.org/wiki/Akaike_information_criterion

[7] http://www.investopedia.com/terms/b/behavioralfinance.)

[8] http://www.ritholtz.com/blog/2011/08/nyt-neurofinance-investors-lack-of-reason/.

[9] The behaviors of Jordanian investors have been evaluated through distributing questioners for various investors from different ages, professions, and social classes; who invest often in ASE. 100 questioners were distributed, 72 were returned and analyzed. (Questioners not included in this study) .