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THE DAY-OF-THE-WEEK EFFECT: DOES OWNERSHIP MATTER?

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ABSTRACT

The aim of this study is to determine the main player behind the existence of the day-of-the-week effect on the Amman Stock Exchange (ASE) by analyzing the trading patterns for investors using the EGARCH model. The sample comprised all companies trading in the financial sector during the period from January 2, 2008, to December 31, 2019. The results show that Jordanian investors are the main players behind the existence of this phenomenon. In contrast, foreign investors do not enhance the existence of this phenomenon. What is striking in the results is that Jordanian institutional investors are the main source of instability in the ASE. Instability in the market has prompted individual investors to imitate institutional investors. This means that traders make the most of their investment decisions based on imitating others, not on weighing the risks and returns, and this reflects a high risk in dealing with the ASE in particular.

Contribution/Originality: This study contributes to the existing literature as it examines the origin of the day-of-the-week anomaly by focusing on the roles of unique characteristics, such as size, value, type of investor, and investor nationality, of companies listed on the ASE, which has not been studied extensively in behavioral finance literature.

1. INTRODUCTION

"The expected return of stock prices should be uniformly distributed across different units of time" (Fama, 1965). One of the postulates of the theory of market efficiency is that expected returns on securities are distributed normally and regularly during the week. This means that there are no significant differences in returns on different trading days. These postulates have been accepted for a long time, although there is no evidence or proof of their validity. After conducting his well-known study on the pattern of stock returns in the US market, (Cross, 1973) was the first to raise doubts about these postulates. In his study, he noticed that a certain pattern of returns was linked to a particular day of the week, with the first trading day of the week (Monday) being marked by negative returns in what became known as the day-of-the-week effect. This important result opened the door to many questions about the reasons for the existence of this effect. This effect was not restricted to the US market, as many researchers have confirmed that this outcome has been observed in a range of other financial markets (French, 1980; Gibbons & Hess, 1981; Lakonishok & Levi, 1982).

The existence of such an effect in financial markets has been interpreted as an anomaly. The difference in the expected returns—rising on one day of the week and declining on another day of the week for no logical reason—is clear evidence of the irrational behavior of the financial market traders. Some researchers attributed the reasons behind this abnormal effect to two main causes the asymmetric information held by traders in financial markets, and psychological and behavioral factors related to traders who are active in financial markets (Abraham & Ikenberry, 1994; Fuller, 1998; Jacobs & Levy, 1988; Wong, Agarwal, & Wong, 2006).

Psychological factors can lead to spontaneous and irrational behavior caused by cognitive bias, and this somehow influences investors' decisions in many international financial markets. Cognitive bias is usually the result of heuristics. Heuristic approaches are usually used when decisions are made in a state of uncertainty (where the information is unavailable or where the circumstances are uncertain). In such situations, it is difficult to make a decision, except by using this approach, due to the limits of time and effort, but this might lead to making the wrong decision.

Heuristics takes many forms, such as overconfidence, herd behavior, and the anchoring effect. Traders' overconfidence in financial markets appears when they believe that they have special and exceptional information that will enable them to make important decisions and earn abnormal profits (profits that are greater than those of others) even in situations where they are unsure about the outcome (Hirshleifer, Subrahmanyam, & Titman, 1994).

Herd behavior is a social trend that appears when some traders in the market put in and ask for specific securities while ignoring others, merely imitating other traders rather than opting for logical and scientific reasons. A large body of evidence confirms that individuals in general want to take decisions similar to the decisions of others, especially the decisions of a group, even if that person feels deep down that their own decision is correct or that decision contradicts their own ideas and choices. This behavior increases in exceptional circumstances to which financial markets may be exposed. Some people believe that if the decision taken turns out to be wrong, they do not care that their decision was the same as the decision of others, but it is difficult for the individual to accept that their own decision is wrong and that others are right (others' loss mitigates his own loss). These convictions are linked closely to culture, customs and traditions. The existence of this effect in a market reflects high risk and is an indicator of market immaturity.

The anchoring effect appears when some traders in the financial market deal with specific securities and ignore other securities based on their analysis and the information they obtained according to an implicit reference point they hold in their minds (Tversky & Kahneman, 1974). The impact of anchoring and herding is not limited to traders in financial markets, but the impact of this phenomenon on stock markets exceeds that on all other areas of life and is also noted as being significant by real estate brokers and financial analysts (Ackert & Deaves, 2010).

The aim of this study is to determine the main player responsible for the day-of-the-week effect in the Amman Stock Exchange (ASE) by analyzing the trading patterns of investors. Specifically, unique characteristics, such as investor type (institutional/individual) and investor nationality (Jordanian/foreign), are examined while taking into account firm size and value.

In addition, this study consists of six other sections. The second section gives an overview of previous studies; the third section gives a brief overview of the ASE; the fourth section explains the methodology of the study, sample, data, and model used; the fifth section discusses the results of the model; the sixth section highlights the findings; and the seventh section offers recommendations.

2. LITERATURE REVIEW

2.1. Previous Studies

Lakonishok and Maberly (1990) examined whether the weekend effect is related to the trading patterns of individual and institutional investors in the NYSE market. The empirical results found a relative increase in the trading activity by individuals on a Monday. The results also showed that there is a tendency for individuals to

increase the number of sell transactions relative to buy transactions, which might explain at least part of the weekend effect. Abraham and Ikenberry (1994) examined whether the weekend effect is related to the trading pattern of individual investors in the NYSE market. The empirical results showed that the trading behavior of individual investors appears to be at least one factor contributing to this pattern. In addition, individual investors are more active sellers of stocks on Mondays, particularly following bad news in the market.

Sias and Starks (1995) examined whether individual investor behavior is the primary cause of the weekend effect. The empirical results led to the following conclusions: First, institutional behavior is the primary source of day-of-the-week return differences. Second, day-of-the-week patterns in returns and volumes are more pronounced in securities in which institutional investors play a greater role. Chan, Leung, and Wang (2004) examined the impact of institutional investors on the Monday seasonal on three main stock exchange indexes—NYSE, AMEX and NASDAQ—covering the period between 1981 and 1998. The empirical results supported the belief that the Monday seasonal may be related to the trading activities of less sophisticated individual investors.

Martin, Bohl, and Pierre (2009) attempted to test whether seasonality in stock returns is related to the trading behavior of individual and institutional investors in Chinese stock markets. The GARCH statistical method was used over the period from 1994 to 2007. The empirical results suggested that institutional rather than individual investors are the main driving force behind these anomalies. Morse, Nguyen, and Quach (2015) examined the day-of-the-week trading patterns of individual and institutional investors on a random sample of 300 common stocks listed on the NYSE. The empirical results led to the following conclusions: First, the increase in the proportion of trading volume on Mondays is attributed to individual investors relative to other days of the week. Second, this increase results from a reduction in trading by institutional investors, rather than from an absolute increase in trading by individual investors. Third, the degree of the day-of-the-week effect varied with the quality and dissemination of public information proxy by the market capitalization of each company. Richards and Willows (2019) examined the trading behavior of individual investors on Monday mornings by investigating the trading activity of 7,200 UK investors. The results showed that, first, individual investors prefer trading on Mondays and trade in a W-shaped intraday pattern. Second, investors increased their selling of losses on Monday mornings, suggesting that investors utilize spare time to process difficult trading decisions. Bishal, Wang, Gurun, and Cready (2019) documented day-of-the-week trading patterns of individual investors using actual trading data rather than proxies to measure individual investors' activity, such as the percentage of odd-lot trading. The results illustrated that the trading activity of individual investors on Mondays is lower than previously documented. In addition, individual investors' trading activity during the week broadly follows corporate announcement patterns.

Kim, Ok, and Park (2020) examined whether institutions are sophisticated investors that exploit stock characteristics known to predict future returns in Korea, using data from 2000 to 2018. The researchers analyzed the institutional demand, measured as a change in institutional ownership, for stocks with eight well-known anomalies as well as the future abnormal returns of institutional trading. The empirical results showed that institutions do not trade consistently with stock anomaly predictions because they are reluctant to hold both highly overvalued and highly undervalued stocks. In addition, positive long-leg returns are concentrated on stocks sold by institutions, while negative short-leg returns are concentrated on stocks bought by them.

Unlike these previous studies, this study attempts to examine the day-of-the-week phenomenon in the Amman Stock Exchange (ASE) by focusing on the roles of the unique characteristics of each company, such as size and value, the type of investor (institutional/individual), and investor nationality (Jordanian/foreign).

The focus of this study, the ASE, has not been studied extensively in behavioral finance literature. Most previous studies have tested the possibility of a day-of-the-week effect without determining the main player responsible for this phenomenon or offering reasons for its existence, whereas this study attempts to shed light on the trading strategies employed by investors in the ASE.

2.2. Hypotheses

Four hypotheses are addressed in this study:

H1: The trading pattern of Jordanian institutions is mainly responsible for the existence of the day-of-the-week effect in the ASE.

H2: The trading pattern of foreign institutions is mainly responsible for the existence of the day-of-the-week effect in the ASE

H3: The trading pattern of Jordanian individuals is mainly responsible for the existence of the day-of-the-week effect in the ASE.

H4: The trading pattern of foreign individuals is mainly responsible for the existence of the day-of-the-week effect in the ASE.

3. AMMAN STOCK EXCHANGE

The Amman Stock Exchange was established in 1978. It is one of the oldest and most important financial markets in the Middle East.

The market consists of 191 companies distributed across three sectors. It issues a wide range of securities, including stocks, bonds, and other types of equities. Trading on the market starts on Sunday and ends on Thursday, so the trading days on the ASE differ from some other Arab markets, such as the Beirut Stock Exchange (BSE). It is also different from many international stock exchanges, such as the New York Stock Exchange (NYSE), the London Stock Exchange (LSE), and the Tokyo Stock Exchange (TSE). Trading hours start at 10:30 am and end at 12:30 pm (Jordanian time).

Table 1. Key Statistics of the ASE (2015–2019).

Key Statistics of the ASE	2015	2016	2017	2018	2019
Number of listed companies	228	224	194	195	191
Market capitalization (JD million)	17,984.674	17,339.385	16,962.551	16,122.694	14,914.795
Non-Jordanian ownership of market capitalization (%)	49.5	49.6	48.1	51.7	51.6

Source: https://www.ase.com.jo/ .

Table 1 shows some of the important facts about this market (2015–2019). The table also shows a decrease in the number of listed companies by 16.2% and a market capitalization decrease of 17.07%. Despite this decrease, foreign investors' ownership increased by 5%, which reflects the confidence of investors in both the ASE and the Jordanian economy. Despite the modest performance of the ASE and the location of Jordan in the heart of the unstable and volatile Arab region, the ASE remains one of the world's most favored markets because of its ability to attract investments (especially Arab investments) and because of its security and stability.

This is due to the factors of familiarity that arise from the region using the same language, culture and geographical location, which attract many Arab investors. However, the ASE has also managed to attract investors from more than 100 global nationalities, and its non-Jordanian ownership ratios have never been less than 50% (on average). Table 2 shows the securities ownership classified by nationality (the top ten) during the 2015–2019 period.

Table 2. Shareholders' ownership (%) in the ASE according to nationality.

Nationality	2015	2016	2017	2018	2019
Saudi Arabian	5.096	5.245	6.003	6.324	7.091
Kuwaiti	6.162	5.960	5.942	5.948	5.158
Qatari	5.567	5.607	6.117	6.362	4.833
Bahraini	3.208	3.835	4.237	3.958	4.179
Libyan	2.937	3.048	3.542	3.694	3.077
Chinese	0.000	0.000	0.000	2.035	3.046
Palestinian	1.589	1.613	1.754	2.084	2.320
Mixed/Arabian	1.930	1.815	1.606	1.589	2.190
Lebanon	6.639	6.729	2.280	2.309	1.886
Iraqi	1.222	1.251	1.040	1.081	1.228
American	3.538	3.506	3.158	0.977	0.823

Source: https://www.sdc.com.jo.

4. METHODOLOGY

4.1. Model

To achieve the goal of this study, which is to explore the main reason behind the existence of the day-of-the-week effect phenomenon in the Amman Stock Exchange (ASE), the famous model developed by French (1980) was used to examine the abnormal effects using dummy variables.

This is presented in Equation 1 as follows:

$$R_{it} = \beta_0 + \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \beta_5 D_{5t} + e_{it} \quad (1)$$

Where R_{it} is the daily stock return for the ASE; β_0 is a fixed variable; and β_1, β_2, β_3, β_4 and β_5, are the coefficients of the dummy variables for Sunday, Monday, Tuesday, Wednesday and Thursday, respectively.

The daily stock return for the ASE (R_{it}) is calculated in Equation 2:

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

Where P_t is the value of the index at date t; and P_{t-1} is the value of the index of the previous working day.

To select the best fitting symmetric and asymmetric GARCH models, the author found that the exponential generalized ARCH model, EGARCH(1,1), is one of the best models for interpreting this effect. This model has the largest log-likelihood and minimum information criteria [Akaike information criterion (AIC) and Schwarz information criterion (SIC)] among the TARCH and GARCH models in most series (results not included).

The EGARCH model (Nelson, 1991) captures asymmetric effects between positive and negative stock return volatility, and it can be used to determine the existence of the day-of-the-week effect. If the results of the equation for the returns show that the coefficients of the dummy variable differ (some may be negative) over the days of the week, then this would be strong evidence for the existence of the day-of-the-week effect. The model is as follows:

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

Where

σ_t^2 is the one-period-ahead forecast variance based on past information and is referred to as the conditional variance; W is a constant term; ε_{t-1} represents the volatility from the previous period, measured in terms of the lag of the squared residual from the mean equation; $\sigma t\text{-}1$ is the last periods' forecast variance; the $\beta 1$ coefficient represents the measure of shock persistence; and γ represents the asymmetric volatility, which determines the size of the asymmetric volatility and if the asymmetric volatility is positive or negative (Brooks, 2014).

$\gamma = 0$ indicates symmetry.

$\gamma \neq 0$ indicates asymmetry.

$\gamma < 0$ indicates that negative shocks increase the volatility more than positive shocks.

$\gamma > 0$ indicates that positive shocks increase the volatility more than negative shocks (indicating the existence of the leverage effect).

4.2. Sample Selection

The initial sample for this study comprised all 102 companies trading in the financial sector. After excluding companies that were removed from the trading list during the study period, 76 companies remained in the final sample[1], which corresponds to 40% of companies operating in the market in 2019. This sample is representative of the companies of interest to this study for the following reasons:

1. Although the financial sector is the most active sector in the ASE, the number of observations for companies in the sample varies greatly, ranging from 1113 to 2962. Performing panel data analysis with many missing variables could lead to inaccurate results, thus time series data were used to maximize the number of companies that can be included in the sample.

1) The financial sector is characterized by a diversity of investor types (institutional/individual) and nationalities (Jordanian/foreign).

2) The financial sector is the most actively traded sector on the ASE.

3) The companies in the sample include the most important companies on the ASE in terms of market capitalization, profitability, and number of listed shares.

4.3. Data

Daily closing share prices of the selected companies are used to indicate the returns during the period from January 2, 2008, to December 31, 2019. In addition, the number of shares held by institutional and individual investors,[2] taking into account their nationalities (Jordanian/foreign), for the selected companies is used as a proxy to determine the dominant players in each company. All of the data generated and/or analyzed during the study were obtained from the Amman Stock Exchange (ASE) and Securities Depository Centre (SDC) websites.

The stationarity level of this period was tested before the analysis, and it was found that the data were stable (stationary at the first level) according to the Augmented Dickey–Fuller (ADF) test (Appendix A).

4.4. Portfolio Construction

Portfolios were constructed using factors as suggested by Fama and French (the three-factor model). In addition to the size, stock return, and value factors, a factor representing investor type (institutional/individual) and nationality (foreign/Jordanian) was used to shed more light on the trading strategies employed by investors in the ASE. To create the portfolios, the sample of 76 companies was divided into two groups: institutional investors and individual investors. Then, the companies were sorted based on various parameters. Next, the companies were sorted by size into big (B) and small (S) based on the median company size in the financial sector. The companies were then divided into three groups—low (L), medium (M), and high (H)—based on the value of the book equity to market equity ratio. Finally, the companies were divided into two groups based on investor nationality: Jordanian investors (J) and foreign investors (F). Based on all potential two-group intersections according to size, value, and investor nationality, the following 19 portfolios were built: J/S/L, J/S/M, J/S/H, J/B/L, J/B/M, J/B/H, F/S/L, F/S/M, F/B/L, F/B/M, and F/B/H for institutional investors and J/S/L, J/S/M, J/S/H, J/B/L, J/B/M, J/B/H, F/B/L, and F/B/M for individual investors.

5. RESULTS AND DISCUSSION

The results of the EGARCH model for the group of institutional investor portfolios are shown in Table 3, which presents several interesting findings that warrant further discussion. First, the average returns on weekdays fluctuate greatly. The average returns for most days of the week are significantly negative for 32 of the 38 companies. Second, stock returns on the first day of trading fluctuate greatly. The average returns on Sundays are statistically significantly negative for ten companies: ARBK, EMAR, IHCO, PHNX, FUND, and DERA at the 1% level; CARD and JDPC at the 5% level; and JCBK and ULDC at the 10% level. By contrast, the average returns on Sundays are significantly positive for five companies and insignificant for the remaining 23. Third, the high statistical significance of $|\beta|$ (in most series) clearly shows that news on volatility from past periods has an impact on current volatility. Fourth, the asymmetry parameter (γ) is highly significant, with a positive sign for 12 companies, a negative sign for seven companies and is insignificant for the other 19 companies, providing empirical evidence of an asymmetric response in daily stock returns. That is, positive shocks (good news) have a larger impact on future volatility than negative shocks (bad news) of the same magnitude.

2. Using ownership data for large shareholders (who own more than 1%) as a proxy for investors ownership.

The negative returns on Sundays are clear evidence of the existence of the day-of-the-week anomaly among this group of institutional investors. Whether good or bad, news released on weekdays is the main driver of investors' behavior, particularly for Jordanian institutional investors, except for companies that are small and have a low book equity to market equity ratio. Thus, the first hypothesis, which posits that the trading pattern of Jordanian institutions is mainly responsible for the existence of the day-of-the-week effect in the ASE, is supported. On the contrary, the second hypothesis, which states that the trading pattern of foreign institutions is responsible for the existence of the day-of-the-week effect in the ASE, is rejected.

Table 3. EGARCH results: The first group (stocks owned by institutional investors).

	Company Symbol	Sunday	Monday	Tuesday	Wednesday	Thursday	ɣ	B
J/S/L	JDFI	(0.048)***	(-0.037)***	-0.011	-0.000	(-0.025)***	(-1.265)***	(-0.110)
	RUMI	(1.755)***	(1.763)***	(1.773)***	(1.771)***	(1.764)***	-0.018	(0.887)***
	SALM	-0.006	-0.007	(0.020)**	0.002	-0.000	(-0.059)***	-0.012
J/S/M	APCT	0.003	0.000	(-0.011)***	0.002	0.000	(0.315)***	(-0.126)**
	IHCO	(-0.005)***	0.000	(-0.005)**	0.001	-0.000	0.002	(0.818)***
	JOMC	0.003	0.002	0.001	-0.001	-0.001	(0.056)***	0.905)***
	SIJC	(0.002)*	(-0.002)*	-0.002	-0.000	-0.002	0.007	(0.783)***
	THDI	-0.001	-0.000	-0.002	-0.001	0.000	0.020	(0.853)***
J/S/H	CARD	(-0.003)**	-0.002	(-0.003)**	-0.002	-0.002	-0.028	(0.881)***
	INMA	-0.001	-0.001	(-0.002)**	(-0.003)**	0.002	0.017	(0.944)***
	EMAR	(-0.003)***	(-0.002)**	-0.001	(-0.003)***	(-0.002)**	-0.001	(0.910)***
	UCFI	0.000	0.001	-0.014	-0.000	-0.002	(-0.196)***	(0.589)***
J/B/L	ARBK	(-0.002)***	(-0.001)*	(-0.001)***	(0.004)***	(-0.001)***	(-0.320)***	(0.364)***
	BOJX	0.000	(0.001)**	0.001	-0.000	-0.000	(0.072)***	(0.831)***
	FUND	(-0.005)***	(0.006)***	0.000	0.000	0.0001	0.0399	(0.653)***
	ULDC	(-0.005)*	(-0.009)***	(-0.008)***	-0.000	-0.005	(-0.096)***	(0.589)***
	MEET	0.001	-0.000	-0.001	-0.000	0.001	-0.004	(0.955)***
J/B/M	CABK	0.000	-0.000	(0.001)**	(-0.001)*	-0.001	(-0.051)***	(0.665)***
	DERA	(-0.003)***	-0.001	0.001	(-0.002)**	-0.001	0.002	(0.693)***
	JCBK	(-0.002)*	0.000	0.000	-0.002	0.001	(0.045)**	(0.854)***
	PHNX	(-0.004)***	-0.001	(-0.002)*	(-0.003)***	0.001	-0.002	(-0.181)***
	REDV	-0.002	0.001	-0.001	(-0.002)**	(-0.004)***	-0.010	(0.957)***
	SANA	-0.001	-0.001	-0.000	(-0.002)*	-0.001	0.026	(0.827)***
	SIBK	(0.003)***	(-0.001)**	0.001	-0.000	-0.000	(0.153)***	(0.977)***
J/B/H	JDPC	(-0.003)**	0.000	-0.002	-0.001	-0.002	(0.147)***	(0.502)***
	JLGC	(0.002)*	-0.000	-0.000	(-0.003)**	-0.001	-0.004	(0.928)***
	PROF	-0.001	-0.001	0.001	-0.000	-0.000	(0.039)**	(0.899)***
F/S/L	NCMD	0.007	(-0.006)***	-0.002	(0.012)***	(-0.016)***	(0.885)*	(-0.006)
F/S/M	AICJ	-0.003	-0.003	0.000	-0.001	-0.001	-0.014	(0.656)***
F/B/L	JOIB	0.000	0.000	-0.000	(0.001)***	(-0.001)*	(0.163)***	(0.954)***
	THBK	-0.000	(-0.002)***	0.000	0.000	0.000	(0.077)***	(0.191)***
F/B/M	UBSI	0.000	0.000	0.000	-0.000	-0.001	(-0.126)***	(0.656)***
	AMMI	-0.002	-0.001	0.000	(-0.007)***	0.001	(0.498)***	(0.954)***
	AOIC	0.001	(-0.005)*	-0.005	-0.001	0.000	0.021	(-0.005)
	FINS	-0.001	-0.001	-0.0001	0.001	-0.000	-0.007	(0.857)***
	JOKB	-0.000	0.000	-0.000	-0.001	(-0.002)***	0.009	(0.877)***
	SGBJ	0.001	0.001	0.001	-0.003	-0.001	(0.088)***	(0.976)***
F/B/H	TAJM	0.001	0.000	(-0.002)**	(-0.002)**	0.000	0.025	0.934)***

Note: *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Similar findings are obtained from the results of the EGARCH model for the group of individual investors (see Table 4). First, stock returns on weekdays fluctuate greatly; the average returns for most days of the week are significantly negative for 29 of 38 companies. Second, stock returns on the first day of trading fluctuate greatly. The average returns on Sunday are significantly negative for 9 companies: AMAD, AMON, and JERY at the 1% level; FUTR, UNAI, and JIJC at the 5% level; and DARA, ATTA, and NAAI at the 10% level. By contrast, the average returns on Sunday are significantly positive for 5 companies and insignificant for the remaining 24 companies. Third, the high statistical significance of $|\beta|$ (in most series) indicates that news on volatility from past periods influences current volatility. Fourth, the asymmetry parameter (γ) is highly significant with a positive sign for ten companies, a negative sign for seven companies, and is insignificant for the remaining 21 companies, providing evidence of an asymmetric response in daily stock returns. That is, positive shocks (good news) have a larger impact on future volatility than negative shocks (bad news) of the same magnitude.

Similar to institutional investors, the negative returns on Sundays related to the group of individual investors are clear evidence of the existence of the day-of-the-week anomaly. News released on weekdays, whether good or bad, is likely the main driver of investor behavior among individual Jordanian investors, except for companies that are big and have a low book equity to market equity ratio or are medium-sized and have a high book equity to market equity ratio. As a result, the third hypothesis, which states that the trading pattern of Jordanian individuals is mainly responsible for the existence of the day-of-the-week effect in the ASE, is accepted. In contrast, the fourth hypothesis, which posits that the trading pattern of foreign individuals is mainly responsible for the existence of the day-of-the-week effect in the ASE, is rejected.

Table 4. EGARCH results: the second group (stocks owned by individual investors).

	Company Symbol	Sunday	Monday	Tuesday	Wednesday	Thursday	ɣ	B
J/S/L	ENTK	-0.001	0.001	0.000	-0.000	0.001	0.009	(-0.460)
	NAAI	(-0.006)*	-0.005	-0.000	-0.004	(0.007)**	0.114	(0.406)***
	PHIN	-0.007	0.002	0.003	-0.005	-0.006	0.530	(-0.601)
	UNAI	(-0.003)**	-0.000	0.002	(-0.002)*	0.002	0.022	(0.914)***
	WOOL	-0.000	-0.002	0.002	-0.001	-0.001	(-0.149)***	(0.687)***
J/S/M	AMON	(-0.003)***	(0.002)**	-0.002	-0.001	-0.000	(0.180)***	(0.253)***
	ARGR	-0.000	(-0.007)***	-0.001	-0.002	-0.001	(-0.099)**	(-0.156)****
	ATTA	(-0.002)*	0.000	(0.002)*	-0.001	-0.001	(-0.032)***	(0.997)***
	BLAD	0.001	-0.003	0.003	-0.002	-0.002	(0.103)***	(0.960)***
	COHO	-0.001	-0.000	-0.001	0.001	(-0.002)*	0.027	(0.885)***
	JEIH	-0.001	-0.001	-0.001	-0.001	0.001	(0.028)**	(0.925)***
	JOFR	0.001	-0.000	0.001	0.001	(-0.004)**	0.0267	(0.850)***
	KAFA	-0.002	(-0.003)*	-0.002	-0.001	0.001	-0.0583	(0.639)***
	MHFZ	-0.002	-0.001	(-0.002)*	0.000	-0.001	(0.144)***	(-0.051)
	VFED	-0.004	0.001	0.000185	-0.000	0.003	(-0.127)***	(-0.389)***
	SHRA	-0.002	-0.002	(-0.006)***	-0.001	(0.003)**	(-0.180)***	(0.303)***
J/S/H	DARA	(-0.002)*	0.001	(-0.002)**	0.001	0.000	0.025	(0.934)***
	FUTR	(-0.002)**	0.001	0.000	-0.001	0.001	-0.012	(0.666)***
	HIPR	0.000	(-0.003)**	-0.000	-0.002	(-0.002)*	-0.019	(0.831)***
	IBFM	-0.002	-0.000	-0.001	-0.002	-0.000	(0.047)**	(0.510)***
	JIJC	(-0.002)**	(-0.002)**	-0.000	-0.001	-0.001	(-0.076)**	(0.763)***
	JNTH	-0.001	-0.001	-0.000	-0.000	0.001	-0.017	(0.930)***
	AMAD	(-0.003)***	-0.001	-0.000	-0.001	-0.001	0.00407	(0.707)***
	JERY	(-0.006)***	(-0.004)**	(0.004)*	0.001	-0.002	(0.448)***	(0.409)***
	THMA	(0.011)**	(0.017)***	-0.006	(0.023)***	-0.006	(0.040)**	(0.579)***
J/B/L	MSKN	-0.001	(-0.003)***	0.002	-0.001	-0.001	-0.0137	(0.589)***
	SPIC	0.000	0.002	-0.001	-0.002	-0.002	-0.0173	-0.166
	UINV	-0.001	0.000	-0.000	-0.000	-0.001	0.011	(0.858)***
J/B/M	AEIV	-0.000	(-0.002)**	(-0.002)**	-0.001	0.001	-0.005	(90.926)***
	AJIB	0.001	0.001	0.001	0.001	(-0.002)**	(0.067)***	(0.857)***
	INVB	-0.001	-0.001	-0.000	(-0.001)**	-0.000	0.015	(0.814)***
	JOIT	-0.000	-0.000	-0.002	(-0.004)**	(-0.003)**	-0.064	(0.706)***
J/B/H	FFCO	(0.001)**	0.001	(-0.001)**	-0.001	0.000	(0.088)***	(0.895)***
	FRST	-0.001	0.000	(-0.002)*	(-0.003)***	-0.001	-0.004	(0.999)***
	IDMC	(0.002)*	(-0.002)**	-0.001	-0.001	-0.001	-0.007	(0.945)***
	JRCD	-0.001	(-0.002)*	0.001	-0.001	-0.001	(0.041)**	(0.849)***
F/B/L	AMAL	-0.001	0.001	(-0.002)**	-0.001	-0.001	(-0.019)*	(0.775)***
F/B/M	EXFB	-0.001	(-0.001)*	(0.001)*	(-0.002)**	-0.000	0.011	(0.877)***

Note: *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

The robustness of these results was verified through the following methods:

a) The Jarque–Bera LM test for normality, which strongly accepts the null hypothesis at the 1% level in most series, so the standardized residuals are normally distributed (see Appendix B).

b) The Lagrange multiplier test, which was used to examine if the variance equation is correctly specified. The test strongly accepts the null hypothesis at the 1% level in most series, so there is no ARCH effect in the standardized residuals (see Appendix C).

6. FINDINGS

This study investigates the day-of-the-week effect, an important phenomenon arising from the inefficiency of financial markets. Previous studies have clearly proven the existence of the day-of-the-week effect in many international and emerging markets. However, the present study provides surprising new findings. First, the day-of-

the-week effect was observed only for Jordanian investors, whether individuals or institutions, in companies ranging in size and value. For institutional investors, this effect was observed for all companies except small companies with a low value. For individual investors, this pattern applied to all companies except large companies with a low value and medium-sized companies with a high value. Thus, this study confirms that Jordanian investors are primarily responsible for the existence of this anomaly in the ASE, which is attributable to the persistence of shocks (good or bad news) released on weekdays. Such shocks encourage investors to enter and exit the market quickly after making profits or stopping losses even if the profits or losses are small. Furthermore, the high volatility on Sundays, the first day of trading, emphasizes that most Jordanian investors are noise traders and engage in speculative behavior. The results were robust to any possible measurement errors. What is striking about these results is that Jordanian investors, both individual and institutional, behave in the same way. That is, Jordanian investors make the most of their investment decisions based on imitating others and not on weighing risks and returns. The prevalence of herd behavior among Jordanian investors reflects the high risk in dealing with the ASE.

Second, foreign investors (individual and institutional) do not enhance the existence of this anomaly in the ASE, regardless of company size and value. Furthermore, the high percentage of ownership of Jordanian companies by foreign investors (institutions and individuals) may enhance ASE stability. Thus, this study confirms that foreign investors are not the main players responsible for the existence of this anomaly in the ASE. This result may be attributed to the persistence of high foreigner ownership ratios, which have never been less than 50%, indicating that foreign investors have diversified their portfolios in terms of assets or their distribution among the world's leading markets. Consequently, the decisions of foreign investors are influenced not only by the performance of the ASE but also by the performance of the other stock markets in which they invest. In other words, these traders make most of their investment decisions by weighing risks and returns and have their own strategies for investing in the ASE, and herd behavior imitating Jordanian investors is not the prevailing culture. These results were also robust to any possible measurement errors. Consistent with this result, previous studies have indicated that a high percentage of ownership by foreign investors increases market stability (Donghui, Nguyen, Pham, & Wei, 2011; Kamara, 1997); however, other studies have found that the presence of institutional investors destabilizes stock prices (Lakonishok., Shleifer, & Vishny, 1992). The findings of this study challenge many previous studies that have maintained that individual investors are mainly responsible for the day-of-the-week effect.

7. RECOMMENDATIONS

The results of this study have important implications for both investors and legislative authorities. For investors, this study provides important information by explaining the pattern of market returns and volatility for the ASE. Investors could exploit this pattern to achieve additional returns on certain days and develop their portfolios. For legislative authorities, the results highlight the need for new strategies to increase transparency and disclosure by companies operating in the market. Such efforts are necessary to ensure that investors are confident that the information they have is sufficient to make the correct investment decisions and achieve a balance between risks and returns. Confident investors will be less likely to imitate others, which will improve the investment environment. Future research should consider other sectors of the ASE to determine whether the results are similar to those for the financial sector.

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Appendix A. Augmented Dickey–Fuller test.

Company	t-Statistic	Prob.*	t-Statistic for critical values	Level
ARAB	-38.624	0.000	-3.432	1%
CARD	-50.128	0.000	-3.433	1%
RDERA	-46.260	0.000	-3.434	1%
EMAR	-50.944	0.000	-3.433	1%
FUND	-39.777	0.000	-3.434	1%
IHCO	-34.106	0.000	-3.435	1%
JDPC	-43.437	0.000	-3.433	1%
JCBK	-29.252	0.000	-3.434	1%
ULDC	-17.532	0.000	-3.433	1%
PHNX	-34.106	0.000	-3.435	1%
AMD	-48.510	0.000	-3.433	1%
AMON	-48.607	0.000	-3.433	1%
ATTA	-48.450	0.000	-3.433	1%
DARA	-48.035	0.000	-3.433	1%
FUTR	-49.079	0.000	-3.433	1%
JERY	-23.843	0.000	-3.445	1%
JIJC	-46.536	0.000	-3.434	1%
NNAI	-21.948	0.000	-3.447	1%
UNAI	-41.273	0.000	-3.433	1%

Note: *The result was significant at the 1% level .

Appendix B. Normality test (Jarque–Bera LM test).

Company	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Jarque–Bera
ARAB	-0.051	-0.032	7.131	-21.791	1.001	-3.605	84.153	(819215.200)*
CARD	0.032	0.070	3.857	-3.668	1.000	-0.064	3.035	1.712
RDERA	0.023	0.039	5.782	-3.123	1.000	0.130	3.642	(37.923)*
EMAR	0.040	0.088	3.495	-4.603	0.999	-0.110	3.267	(13.716)*
FUND	-0.018	-0.001	2.591	-21.362	0.990	-5.316	115.426	(1008518.000)*
IHCO	0.013	0.014	2.531	-3.625	1.000	-0.081	2.019	(58.524)*
JDPC	0.018	0.076	14.446	-13.154	1.000	0.268	36.059	(97203.570)*
JCBK	-0.008	0.000	4.000	-5.748	1.000	-0.083	5.205	(372.716)*
ULDC	0.044	0.020	9.329	-11.890	0.999	-0.947	29.234	(80425.920)*
PHNX	0.028	0.025	25.525	-2.657	0.996	5.902	152.593	(2679586.000)*
AMD	0.013	0.041	4.200	-9.437	0.997	-0.171	7.290	(1647.679)*
AMON	0.010	0.041	15.480	-3.022	1.022	1.379	23.771	(44342.760)*
ATTA	-0.005	0.021	13.304	-3.004	1.004	0.883	13.611	(13133.230)*
DARA	0.001	0.000	10.532	-5.235	1.000	0.387	7.606	(2240.867)*
FUTR	-0.001	0.000	11.770	-2.240	0.997	0.649	10.210	(5228.322)*
JERY	0.011	0.074	3.715	-6.836	1.001	-0.780	9.992	(958.102)*
JIJC	0.013	0.058	3.496	-3.505	1.000	-0.160	3.065	(8.045)*
NNAI	0.059	0.124	4.505	-5.077	1.011	-0.583	6.374	(204.442)*
UNAI	0.003	0.008	2.224	-2.334	1.000	-0.046	1.924	(102.709)*

Note: *The result was significant at the 1% level.

Appendix C. Heteroscedasticity test: ARCH.

ARAB	**F-statistic**	**0.056**	**Prob. F(1,2959)**	**0.811**
	Obs*R-squared	0.056	Prob. Chi-Square(1)	0.811
CARD	F-statistic	25.385	Prob. F(1,2306)	(0.000)***
	Obs*R-squared	25.130	Prob. Chi-Square(1)	(0.000)***
RDERA	F-statistic	1.081	Prob. F(1,1895)	0.298
	Obs*R-squared	1.081	Prob. Chi-Square(1)	0.298
EMAR	F-statistic	24.145	Prob. F(1,2763)	0.000
	Obs*R-squared	23.953	Prob. Chi-Square(1)	0.000
FUND	F-statistic	0.016	Prob. F(1,1895)	0.897
	Obs*R-squared	0.016	Prob. Chi-Square(1)	0.897
IHCO	F-statistic	1.706	Prob. F(1,1417)	0.191
	Obs*R-squared	1.706	Prob. Chi-Square(1)	0.191
JDPC	F-statistic	0.007	Prob. F(1,2131)	0.929
	Obs*R-squared	0.007	Prob. Chi-Square(1)	0.929
JCBK	F-statistic	0.852	Prob. F(1,1826)	0.356
	Obs*R-squared	0.852	Prob. Chi-Square(1)	0.355
ULDC	F-statistic	0.573	Prob. F(1,2787)	0.449
	Obs*R-squared	0.573	Prob. Chi-Square(1)	0.448
PHNX	F-statistic	0.000	Prob. F(1,2853)	0.986
	Obs*R-squared	0.000	Prob. Chi-Square(1)	0.986
AMD	F-statistic	0.001	Prob. F(1,2047)	0.971
	Obs*R-squared	0.001	Prob. Chi-Square(1)	0.971
AMON	F-statistic	0.101	Prob. F(1,2421)	0.750
	Obs*R-squared	0.101	Prob. Chi-Square(1)	0.750
ATTA	F-statistic	1.344	Prob. F(1,2721)	0.246
	Obs*R-squared	1.344	Prob. Chi-Square(1)	0.246
DARA	F-statistic	0.000	Prob. F(1,2462)	0.950
	Obs*R-squared	0.003	Prob. Chi-Square(1)	0.950
FUTR	F-statistic	0.001	Prob. F(1,2335)	0.973
	Obs*R-squared	0.001	Prob. Chi-Square(1)	0.973
JERY	F-statistic	0.005	Prob. F(1,445)	0.943
	Obs*R-squared	0.005	Prob. Chi-Square(1)	0.943
JIJC	F-statistic	0.612	Prob. F(1,1811)	0.434
	Obs*R-squared	0.612	Prob. Chi-Square(1)	0.433
NNAI	F-statistic	0.151	Prob. F(1,382)	0.697
	Obs*R-squared	0.151	Prob. Chi-Square(1)	0.696
UNAI	F-statistic	22.792	Prob. F(1,2112)	(0.000)***
	Obs*R-squared	22.570	Prob. Chi-Square(1)	(0.000)***

Note: *, *** The result was significant at the 1% and 10% level.