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Article

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BANKING & FINANCE | RESEARCH ARTICLE

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BANKING & FINANCE | RESEARCH ARTICLE

Day-of-the-week effect on the Tunisian stock market return and volatility

Abdelkader Derbali^{1*} and Slaheddine Hallara²

Abstract: In this paper, we examine empirically the day-of-the-week effect on the Tunisian stock exchange index (TUNINDEX) return and volatility. We use three multivariate general autoregressive conditional heteroscedasticity models (GARCH (1,1), EGARCH (1,1), and TGARCH (1,1)) to examine the presence of daily anomalies in the TUNINDEX returns and volatilities during the period from 31 December 1997 to 07 April 2014. The empirical results of GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) model indicate the existence of a significance and positive effect for Thursdays and for the return at $(t - 1)$ on the return and volatility of TUNINDEX in a threshold of 1%. Additionally, we find the presence of a significance and negative effect for Tuesday on the TUNINDEX return and volatility. Also, we can show the persistence of volatility in the case of Tunisian stock market index.

Subjects: Corporate Finance; Mathematical Economics; Risk Management; Social Sciences

Keywords: day of the week; volatility; returns; GARCH; T-GARCH; E-GARCH; TUNINDEX

JEL classifications: C22; G10; G12

1. Introduction

The hypothesis of efficiency of markets (HEM) postulates that the stock exchanges must effectively reflect all information available on their fundamental value. The assumption of efficiency of the



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PUBLIC INTEREST STATEMENT

The movements of the stock market prices are among some phenomena that have been studied through several academic disciplines and have cumulative research evidence. This study investigates the presence of the day-of-the-week anomalies in the case of the Tunisian stock exchange index (TUNINDEX) using three GARCH models. The day-of-the-week effect is a phenomenon that constitutes a form of anomalies of the efficient capital markets theory. This paper examines day-of-the-week effect on the available data of daily returns on the weighted index in the Tunisian stock exchange index during the period from 31 December 1997 to 07 April 2014. The empirical findings of this paper show the persistence of volatility in the case of Tunisian stock market index.

market was contradicted by anomalies such as the calendar of the anomalies, the fundamental anomalies, and the technical anomalies. The calendar of the anomalies refers to the tendency of the titles to behave differently over a particular day of the week, or month of the year. Among these anomalies, the effect of the day of the week was seen like one of the most important models and it was noted in several actions on several financial markets (Balaban, 1995; French, 1980; Jaffe & Westerfield, 1985; Lian & Chen, 2004).

The effect of the day of the week indicates that the returns are abnormally high over certain days of the week than other days. More precisely, the results resulting from several empirical studies showed that the average return of Friday is abnormally raised, and the average return of Monday is abnormally low. Moreover, the rational investor must take account of the risk or the volatility of the returns while making decisions of investment.

However, the investors could buy actions with abnormal daily returns and sell actions with high abnormal daily returns. This phenomenon was developed in several former work such as Aggarwal & Rivoli (1989), French (1980), and Gibbons and Hess (1981). However, all studies above concentrates only on the equations of the average returns of the stock exchange markets and uses the methods of ordinary least squares (OLS) like method of estimate to regress the outputs on five daily dummy variables.

In this paper, we investigate empirically the effect of the day of the week on the stock returns and volatility of the Tunisian stock exchange market. We use daily returns of the Tunisian stock exchange index (TUNINDEX) over the period from 31 December 1997 to 07 April 2014. For the econometric methodology, we employ a general autoregressive conditional heteroscedasticity models based in the GARCH (1,1), EGARCH (1,1), and TGARCH (1,1).

The empirical findings of estimated GARCH models indicate the existence of the impact of the day of the week on the stock returns and volatility of the TUNINDEX. Then, the results of GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) models show the existence of a highly and positive effect for Wednesday, Thursdays, Friday, and the past return at date $(t - 1)$ on the stock returns and volatilities. However, Tuesday have a negative effect. The estimation results of EGARCH (1,1) and TGARCH (1,1) models indicate the highly impact of the returns observed at date $(t - 1)$ and a significance and positive impact of Thursdays on the TUNINDEX returns.

The rest of this paper is organized as follows: Section 2 provides a review of the related literature. In Section 3, we present the econometric methodology based on the GARCH models. We expose the data used in our paper in Section 4. Section 5 shows and analyzes the empirical results of the estimation of the conditional heteroscedasticity models. Section 5 concluding remarks.

2. Literature review

Many empirical works on the effect of the day of the week in the outputs of the actions was undertaken so much on the developed and emergent markets as French (1980) and Gibbons and Hess (1981). All these studies have obtained different conclusions on the effect of the day from the week on the stock returns and volatility.

Athanassakos and Robinson (1994) and Dubois and Louvet (1996) examine the effect of the day of week for the emerging developed markets. Their empirical results show that Monday has a negative effect on the stock exchange returns for the United States, the European markets, and in Hong Kong, Tuesday has a negative effect on the stock returns for Australia, Japan, and South Korea.

The studies made by Kato (1990) show that Tuesday has a weak effect but Wednesday has a highly effect on the stock returns for Japan.

The study developed by Poshakwale and Murinde (2001) show that Monday has a negative and significant effect while Friday has a positive effect on the stock returns in the stock exchange markets of Hungary and Poland.

Brooks and Persaud (2001) evaluate the elements of proof of the day of the week for five countries of the South Asia: Malaysia, South Korea, Philippines, Taiwan, and Thailand. They found one day of the week which has a significant effect among three of the five studied stock markets. However, they concluded moreover that the risk of market alone can be insufficient to capture the anomalies of calendar.

Hui (2005), by using the nonparametric test, examines the effect of the day of the week for four markets of the Asia-Pacific and two developed markets. The empirical results show that Hong Kong, Taiwan, and Singapore show higher average returns on Fridays and of the weak influence of Monday in the average returns, but for the United States, Japan, and South Korea we can show the existence of a mixed model. As a whole, it is only in Singapore that one day ago of the week which has an important effect.

In their studies of the Chinese stock market, Cai, Yuming, and Yuehua (2006) found the presence of the day-of-the-week effect with negative returns on Mondays and Tuesday.

Some of the studies in Africa include Agathee (2008), Aly, Mehdian, and Perry (2004), Chukwuogor-Ndu (2006) and Tachiwou (2010). For example, Aly et al. (2004) examine the day-of-the-week effect on the stock returns in Egypt. On average, its study indicated that Monday has a positive and significant effect on the stock returns. Tachiwou (2010) develops an analysis on the effect of the day of the week on regional stock market in West Africa over the period 1998–2007. Their empirical results show that the returns are the lowest on Tuesday and Wednesday and they are higher on Friday.

AL-Mutairi (2010) finds an evidence of the presence of the day-of-the-week effect in the stock exchange of Kuwait. Their empirical results show that the outputs of Saturday have a positive and higher impact than other days of the week except Wednesday, which suggests that the Kuwaiti stock exchange market is ineffective.

Hussain, Hamid, Akash, and Khan (2011) analyze the effect of the day of the week on Karachi stock exchange. They revealed significant effects for Tuesday.

Ulussever, Yumusak, and Kar (2011) study the stock exchange of Saudi and they provided evidence of the presence of the day-of-the-week effect on the daily stock returns.

The study of Gonzalez-Perez and Guerrero (2013) utilizes data belonging to S&P 500 during the period from 2004 to 2011. Their empirical findings are supportive of US market efficiency with the absence of DoW effect in the daily S&P 500 returns. Therefore, they conclude that designing a trading strategy without taking any risk will not lead to attaining abnormal returns as there is no deterministic seasonal pattern. Confirmative findings that are opposite to the DoW effect are also documented by Carlucci, Junior, and Lima (2013) for the main stock exchange indices of Canada and US over the period from 2002 to 2012. Furthermore, another research conducted by Puja (2010) shows insignificant results for S&P 500 during the period from 01 January 1990 to 30 November 2004.

Berument and Dogan (2012) investigate the stock market returns and volatility nexus using US daily returns over the period from 26 May 1952 to 29 September 2006. The empirical findings report did not confirm the proposition that the return–volatility relationship is present and the same for each day of the week.

More recently, Abdalla (2012) studies the anomalies of calendar in the stock exchange market of Khartoum. The empirical results did not reveal the presence of an effect of the day of the week on the stock returns and volatility.

Gharaibeh and Al Azmi (2015) investigate empirically the day-of-the-week effect on the available data of daily returns on the weighted index in the Kuwait stock exchange (KSE) during the period from January 2002 to September 2011. Their empirical findings show that the KSE exhibits positive returns on the first and the last day of the week with significant negative returns on the second day of the trading week.

3. Methodology

In this section, we define the econometric methodology used in this paper which based in a three general autoregressive conditional heteroscedasticity models, such as GARCH, EGARCH, and TGARCH.

3.1. Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model

The standard GARCH (p, q) model was introduced by Bollerslev (1986) which suggests that the conditional variance of returns is not only dependent on the squared residuals of the mean equation but also on its own past values. The standard GARCH model captures the volatility clustering of financial time series. Then, by using an appropriate GARCH model, while controlling for time-varying property of volatility, one can estimate the changes in the information flows, i.e. the impact of recent and old news on volatility. Specifically, log likelihood ratio tests on the GARCH model for $p, q \in \{1, 2, \dots, 5\}$ are employed in order to find the most parsimonious GARCH representation of the conditional variance of returns. A GARCH (p, q) process is represented as follows:

$$R_t = \alpha_1 R_{t-1} + \sum_{i=1}^5 \lambda_i D_{it} + \varepsilon_t \quad (1)$$

$$h_t = \omega_1 + \sum_{i=1}^p \alpha_i \varepsilon_{t-1}^2 + \sum_{j=1}^q \delta_j h_{t-j} + \sum_{i=1}^4 \lambda_i D_{it} \quad (2)$$

where Equations (1) and (2) denote the conditional mean equation and the conditional variance equation, respectively. R_t is the spot returns of the TUNINDEX indexes at time t . R_{t-1} is a proxy for the mean of R_t conditional on past information. h_t is the conditional variance of the period t . Only four out of five days in the week are included in the conditional variance equation to avoid the dummy variable trap in the regression model. Thus, D_{it} 's ($i = 1, 2, \dots, 4$) are dummy variables for Monday, Tuesday, Thursday, and Friday, respectively, and Wednesday is excluded. The GARCH (1,1) is weakly stationary if $(\alpha_1 + \delta_1 < 1)$, α_1 and δ_1 are nonnegative, α_1 (ARCH parameter) represents the news about volatility from the previous period and δ_1 (GARCH parameter) represents a persistence coefficient. If the sum of ARCH and GARCH coefficients ($\alpha + \delta$) is very close to one, the volatility shocks are very persistent. It is an indication of a covariance stationary model with a high degree of persistence and long memory in the conditional variance.

The basic GARCH is symmetric and does not capture the asymmetry effect that is inherent in most stock markets return data also known as the "leverage effect". In the context of financial time series analysis, the asymmetry effect refers to the characteristic of times series on asset prices that "bad news" tends to increase volatility more than "good news" (Black, 1976 and Nelson, 1991). The exponential GARCH (EGARCH) model and the threshold GARCH (TGARCH) model proposed by Glosten, Jagannathan, and Runkle (1993) and Nelson (1991), respectively, are specifically designed to capture the asymmetry shock to the conditional variance.

3.2. Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model

Nelson (1991) proposes the exponential GARCH model which allows the conditional volatility to have asymmetric relation with past data. Statistically, this effect occurs when an unexpected drop in stock price due to bad news increases volatility more than an unexpected increase in price due to good news of similar magnitude. This model expresses the conditional variance of a given variable as a nonlinear function of its own past values of standardized innovations that can react asymmetrically to good and bad news (Drimbetas, Sariannidis, & Porfiris, 2007). Specifically, log likelihood ratio tests on an EGARCH model for $p, q \in \{1, 2, \dots, 5\}$ are employed in order to find the most parsimonious EGARCH representation of the conditional variance of returns. The EGARCH (1,1) model can be specified as follows:

$$R_t = a_1 R_{t-1} + \sum_{i=1}^5 \lambda_i D_{it} + \varepsilon_t \quad (3)$$

$$\ln(\sigma_t^2) = \omega_1 + \delta_1 \ln(\sigma_{t-1}^2) + \alpha_1 \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| + \gamma_1 \frac{\varepsilon_{t-1}}{\sigma_{t-1}} + \sum_{i=1}^4 \lambda_i D_{it} \quad (4)$$

where σ_{t-1}^2 denotes the estimation of the variance of the previous time period that stands for the linkage between current and past volatility. In other words, it measures the degree of volatility persistence of conditional variance in the previous period. $\left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right|$ represents information concerning the volatility of the previous time period. It signifies the magnitude impact (size effect) coming from the unexpected shocks. $\frac{\varepsilon_{t-1}}{\sigma_{t-1}}$ indicates information concerning the leverage ($\gamma_1 > 0$) and the asymmetry ($\gamma_1 \neq 0$) effects. δ_1 , α_1 , and γ_1 are the constant parameters to be estimated. The parameters, λ_i 's are employed to capture the daily effects. ε_t represents the innovations distributed as a generalised error distribution (GED), a special case of which is the normal distribution (Nelson, 1991).

3.3. Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model

The threshold GARCH model (TGARCH) was introduced by Glosten et al. (1993) that captures asymmetric in terms of negative and positive shocks and adds multiplicative dummy variable to check whether there is statistically significant different when shocks are negative. In TGARCH model, it has been observed that positive and negative shocks of equal magnitude have a different impact on stock market volatility, which may be attributed to a “leverage effect” (Black, 1976). In the same sense, negative shocks are followed by higher volatility than positive shocks of the same magnitude (Engle & Ng, 1993). The conditional variance for the simple TGARCH model is defined by

$$R_t = a_1 R_{t-1} + \sum_{i=1}^5 \lambda_i D_{it} + \varepsilon_t \quad (5)$$

$$\sigma_t^2 = \omega_1 + \delta_1 \sigma_{t-1}^2 + \alpha_1 u_{t-1}^2 + \gamma_1 u_{t-1}^2 d_{t-1} + \sum_{i=1}^4 \lambda_i D_{it} \quad (6)$$

where d_t takes the value of 1 if u_{t-1} is negative, and 0 otherwise. So “good news” and “bad news” have a different impact. If $\gamma_1 > 0$ the leverage effect exists and news impact is asymmetric if $\gamma_1 \neq 0$. Notably, the additional parameters, λ_i 's are employed to capture the daily effects.

4. Data

In this study, we use daily closing prices of the principal index in the stock exchange of Tunisia (TUNINDEX). The data-set was considered during the period from 31 December 1997 to 07 April 2014, which including a total of 4,043 observations. The data-set was collected from the website of

the stock exchange of Tunisia. In our paper, the stock exchange returns are defined by ln of the return between two dates (t) and ($t - 1$). The return R_t is calculated as follows:

$$R_t = \ln \left(\frac{P_t}{P_{t-1}} \right) = \ln (P_t) - \ln (P_{t-1}) \quad (7)$$

where P_t and P_{t-1} are the daily closing prices of index TUNINDEX at the date (t) and date ($t - 1$), respectively. Let us note that t indicates the time (day).

Table 1 summarizes the descriptive statistics for the TUNINDEX daily returns for each day of the week. According to this table, we can remark that on average the highly return is for Wednesday (0.201088), followed by Thursday (0.200346) and Friday (0.200099). The lowest average of TUNINDEX returns is for Monday (0.198615) followed by Tuesday (0.199852) during the period of study.

The highly value of standard deviation is for Wednesday (0.400863), followed by Thursday (0.400309), Friday (0.400124), Monday (0.399938), and Tuesday (0.399007).

According to the two statistics of skewness (asymmetry) and kurtosis (leptokurtic), we can remark that all variables used in this paper are characterized by non-normal distribution. The skewness coefficients reflect that the variable is skewed to the right and it is far from being symmetric for all variables. Also, the Kurtosis coefficient indicates that the leptokurtic for all variables used in this study show the existence of a high peak or a fat-tailed in their volatilities.

Then, the positive sign of estimate coefficients of Jarque–Bera statistics show that we reject the null hypothesis of normal distribution of the variables used in our study. Also, the high value of Jarque–Bera coefficients reflects that the series is not normally distributed at the level of 1%.

Figure 1 reports the distribution of the TUNINDEX returns. So, we can observe that the Tunisian stock market index is very volatile which explain the persistence of volatilities.

Figure 2 presents the evolution of the residual series of the TUNINDEX returns during the period of study from 31 December 1997 to 07 April 2014. This figure indicates the presence of highly volatility, implying the existence of time-varying volatilities in the case of the TUNINDEX returns.

The Augmented Dickey–Fuller (ADF) test and the Philips–Perron (PP) test are used to examine the stationary of the time series of the data used in this study. Then, the results of these two tests are presented in Table 2. From this table, we can reject the null assumption of nonstationary of the

Table 1. Descriptive statistics

	D1 Monday	D2 Tuesday	D3 Wednesday	D4 Thursday	D5 Friday
Mean	0.199852	0.198615	0.201088	0.200346	0.200099
Maximum	1.000000	1.000000	1.000000	1.000000	1.000000
Minimum	0.000000	0.000000	0.000000	0.000000	0.000000
Std. Dev.	0.399938	0.399007	0.400863	0.400309	0.400124
Skewness	1.501160	1.510864	1.491524	1.497297	1.499227
Kurtosis	3.253481	3.282709	3.224643	3.241899	3.247682
Jarque–Bera	1,529.295*	1,551.629*	1,507.539*	1,520.524*	1,524.898*
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	4,043	4,043	4,043	4,043	4,043

Notes: This table presents the main statistical features for the TUNINDEX returns. The data period is from 31 December 1997 through 07 April 2014.

*Indicate a significance level at 1%.

Figure 1. TUNINDEX returns over the period from 31 December 1997 to 07 April 2014.

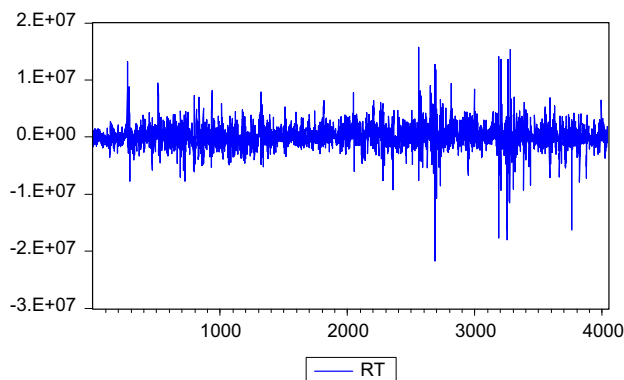
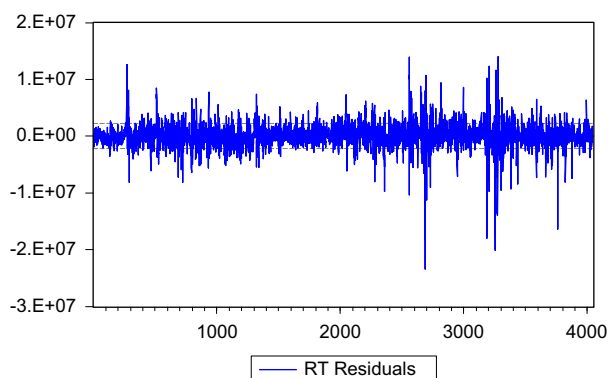


Figure 2. Residuals series of TUNINDEX Return during the period from 31 December 1997 to 07 April 2014.



TUNINDEX returns. Then, we can conclude that the TUNINDEX returns are stationary during the period of study from 31 December 1997 to 07 April 2014.

5. Empirical results

The estimation results of three general autoregressive conditional heteroscedasticity models in the case of TUNINDEX returns are presented in Table 3.

Based on the estimation results of GARCH (1,1) model, we can show that, in the mean equation, we observe the existence of a significance and positive effect for Thursdays and the returns at date $(t - 1)$ with a significance level of 1%. Also, we can remark that Wednesday have a positive impact on the TUNINDEX returns. This impact is significant with a significance level of 5%. Then, Tuesday present a negative impact on the TUNINDEX returns during the period of study from 31 December 1997 to 07 April 2014. However, the results of the variance equation indicate a highly significance level of all GARCH (1,1) parameters specification in the level of 1%. For the daily effect, we can

Table 2. Unit root test results

Augmented Dickey-Fuller test			
Variable	Intercept	With trend and intercept	Without trend and intercept
TUNINDEX	-26.27386*	-26.27168*	-26.05671*
Phillips-Perron test			
Variable	Intercept	With trend and intercept	Without trend and intercept
TUNINDEX	-48.30104*	-48.29572*	-48.24050*

Notes: This table presents the unit root test for the TUNINDEX returns. The data period is from 31 December 1997 through 07 April 2014.

*Indicate a significance level at 1%.

Table 3. Results of estimated GARCH models for TUNINDEX returns

Mean equation			
	GARCH (1,1)	EGARCH (1,1)	TGARCH (1,1)
R_{t-1}	0.265470 (15.86556)*	0.260781 (15.79673)*	0.268641 (15.91967)*
Monday _t	69,688.57 (1.397639)	45,686.04 (0.967173)	58,881.39 (1.147096)
Tuesday _t	-151,204.8 (-2.969272)*	-171,702.2 (-3.817989)*	-167,487.8 (-3.210058)*
Wednesday _t	122,045.7 (2.347673)**	81,629.03 (1.678873)***	107,051.5 (2.057791)**
Thursday _t	158,493.7 (3.033942)*	115,680.6 (2.364359)**	146,589.2 (2.794679)*
Friday _t	142,960.7 (2.867363)*	131,136.5 (2.687249)*	125,421.5 (2.405137)*
Variance equation			
ω_1	3.84E + 11 (16.42245)*	2.894581 (15.14099)*	3.68E + 11 (16.41509)*
α_1	0.283312 (24.06536)*	0.465095 (35.41839)*	0.259363 (17.04848)*
δ_1	0.653288 (64.49909)*	0.009105 (2.955389)*	0.039778 (4.091736)*
γ_1		0.888044 (132.7530)*	0.662790 (64.37662)*
Monday _t	34,775.11 (0.649272)	70,886.76 (1.556719)	116,439.8 (2.358142)*
Tuesday _t	-222,719.8 (-4.112683)*	-158,043.0 (-3.420643)*	-147,690.3 (-2.817204)*
Wednesday _t	294,984.30 (0.663743)	273,942.41 (3.99304)*	228,394.5 (4.839843)*
Thursday _t	70,542.08 (1.296325)	110,151.9 (2.354543)**	150,838.0 (2.903925)*
Friday _t	94,424.81 (1.759013)***	152,695.5 (3.289716)*	171,105.2 (3.366130)*
ARCH-LM test	4.986955 (0.225594)	6.008870 (0.314276)	4.710778 (0.230032)

Notes: This table summarizes the estimated coefficients from GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) models. To test empirically this model, we used daily returns of the Tunisian stock market index (TUNINDEX) over the period from 31 December 1997 to 07 April 2014. Statistical significance at the 1, 5, and 10% threshold is denoted by *, **, and ***.

observe a negative impact of Tuesday in a significance level of 1% and a positive impact of Friday in a significance level of 10%.

Additionally, in the mean equation, we can observe that the estimation results from EGARCH (1,1) and TGARCH (1,1) models are in conformity with the estimation results of GARCH (1,1) model for the highly impact of the return observed at date $(t - 1)$. But, these results are not in conformity with the estimation of GARCH (1,1) model for Thursdays.

From the estimation results of EGARCH (1,1) model, we can find the existence of a significance and positive effect for the TUNINDEX returns at date $(t - 1)$ with a significance level of 1%. We can observe that Tuesday present a negative impact on the TUNINDEX returns in a significance level of 1% during the period of study from 31 December 1997 to 07 April 2014. Then, we can show that Wednesday have a positive impact on the TUNINDEX returns. This impact is significant with a significance level of 10%. We can show the existence of a significance and positive effect for Thursdays with a significance level of 1%. Friday affect positively the TUNINDEX returns at the significance level of 1%. In the results of the variance equation, we can find a highly significance level of all EGARCH (1,1) parameters specification in the level of 1%. For the daily effect, we can observe a negative impact of Tuesday in a significance level of 1% and a positive impact of Thursday and Friday in a significance level of 5 and 1%, respectively.

By using the estimation results of TGARCH (1,1) model, we can observe the existence of a significance and positive effect for the TUNINDEX returns at date $(t - 1)$ with a significance level of 1%. We can remark that Tuesday present a negative impact on the TUNINDEX returns in a significance level of 1% during the period of study from 31 December 1997 to 07 April 2014. Also, we can show that Wednesday have a positive impact on the TUNINDEX returns in a significance level of 5%. We can find the existence of a significance and positive effect for Thursdays and Friday with a significance level of 1%.

From the results of the variance equation, we can show a highly significance level of all TGARCH (1,1) parameters specification in the level of 1%. For the daily effect, we can remark a negative impact of Tuesday in a significance level of 1% and a positive impact of Thursday and Friday in a significance level of 1%.

Finally, the results of ARCH-LM test indicate the absence of an important ARCH effect in the residual series which imply the importance of the conditional variance equations in GARCH models.

6. Conclusion

In this paper, we investigate empirically the day-of-the-week effect on the Tunisian stock exchange returns and volatility. We use a conditional heteroscedasticity specification based on GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) models to examine the presence of the daily anomalies during the period of study from 31 December 1997 to 07 April 2014.

The empirical findings of three GARCH models indicate the presence of the day-of-the-week effect on the Tunisian stock exchange returns and volatility. Then, the estimated results of the GARCH (1,1) model indicate a highly and positive effect for Wednesday, Thursday, Friday, and the past return at date $(t - 1)$. However, Tuesday have a negative effect on the TUNINDEX returns and volatility.

The estimation results of EGARCH (1,1) and TGARCH (1,1) models show a highly impact of the returns observed at date $(t - 1)$. Also, in the case of these two models Thursday have a significance and positive effect on the TUNINDEX returns. We can find that Tuesday have a negative and significant impact with a significance level of 1% on mean and variance equation in the case of EGARCH (1,1) and TGARCH (1,1) models. In consequence of the existence of the effect of the day of the week on the TUNINDEX returns and volatilities, we can suggest that the Tunisian stock market is weak-form inefficient.

Additionally, further research can be directed toward investigating the existence of day-of-the-week anomalies on firm basis rather than focusing on stock market indices.

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