

Damascus Securities Exchange Weighted Index volatilities and Terrorist attacks in Syria

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Abstract This paper examines the interaction between terrorism events and finance, focusing for the first time on the Damascus Securities Exchange Weighted Index return volatility of Syria besieged by terrorist attacks. To do so, we employ three multivariate GARCH models (GARCH (1,1), EGARCH (1,1) and TGARCH (1,1)) to examine the presence of daily anomalies created by terrorist attacks over the period from March 01, 2011 to October 29, 2015. We find terrorism risk is a significant factor in explaining the volatility of stock returns in the case of DSE Weighted Index, which should be taken into account when modeling volatility. From the empirical results of GARCH (1,1), EGARCH (1,1) and TGARCH (1,1) models, we can show the existence of a significance and positive effect for the return at (t-1) on the return volatility of DSE Weighted Index in a threshold of 1%. Additionally, we found that terrorist attacks have a negative impact on the DSE returns. This impact is significant with a significance level of 1% in the mean and variance equations. Also, we can show the persistence of volatility in the case of Damascus Securities Exchange Weighted Index.

Keywords: DSE, volatilities, terrorist attacks, GARCH, EGARCH, TGARCH

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1. Introduction

Everyone was horrified by the terrorist attacks in Paris last Friday, without forgetting those of early January. Definitely, this year 2015 is very strange. In their morbid strategy of the XXI century terrorists aim to shake societal balance.

The ultimate goal is to compete communities of different origins within the targeted countries. Given our history and the structure of our population, it is no coincidence that France is a prime target. If you follow the news, you can easily identify the political class who falls in with both feet into the trap set by the terrorists.

We all know that the springs of the financial markets is confidence. It is therefore legitimate to expect that markets always very quick to be respond the first to show signs of a victory for terror as a crash, or more subtly as a increased volatility indices.

The purpose of this article is to examine the consequences of terrorist attacks in major financial markets. It is a useful exercise for the diligent investor must take into account all aspects of procurement, including the societal and psychological aspects.

With repetition of the terrorist attacks in most countries of the world without exception, many observers have addressed the issue by seeking to analyze the impact engendered by such tragic events in the financial markets.

Worldwide, the terrorist attacks have recently hit all continents, Europe (France), Asia (Lebanon) and Africa (Tunisia and Mali). Let's start with the one in Paris, one of the most deadly and spectacular, which took place on 13 November. The attack seems to have an effect opposite to that expected for the euro zone as Europe Stoxx 600 index marked a positive weekly performance of 3.32%. On the week following the attack in Paris, the CAC 40 gained 2.14% while the German DAX was awarded 3.84% meadows. The UK index FUTSE 100, followed the same trend, and marked by an equally significant increase of 3.54%. On the US market, the S & P 500 went so far as to display its best weekly performance in 2015 (+ 3.3%). These positive reactions such contrast with the tumble all global markets following the devaluation of the Chinese currency Yuan over last August. The European FTSE Eurofirst 300, for example, fell by 3% meadows in the space of 5 sessions.

The attack in Paris has not shaken the confidence of investors who remain quite concerned about the economic outlook, peering among other indicators and aggregates confidence indices, unemployment statistics, orders of capital goods and other major events such as meetings of the board of the Fed or the ECB, etc. The French market, which recalls the attack on Charlie Hebdo, seems to temper his reaction up to respond in a highly symbolic rebound. Do not rule out the weekend effect allowing a

digestion period of these negative informational flows. This behavior is explained by a form of solidarity to terrorism might appear irrational in light of financial orthodoxy and the need to revise upwards the market risk premium. This mimetic behavior on the largest financial centers is mostly unique to developed Western markets which have surprised by their ability to rebound in recent tragic events. Another explanation behind these positive returns this time is of a rational nature, since certain homogeneity has formed around the last anticipations made by these analysts operating in mature markets who expect a strong coalition between France, the EU and Russia to combat terrorism. In this regard, the case of the Russian aircraft capsized Western markets on Monday, fearing a challenge to this mobilization against the Islamic state.

Additionally, the analysts suggest that the magnitude of the medium-term impact will be substantially similar to that recorded after the attacks on the London Underground in 2005 and that of Madrid in 2004. The market seems to integrate risk safe, from the spectacular attacks in New York of 11/09, as most listed companies are multinationals exposed to a multitude of controllable and uncontrollable risks in all areas of the globe. Acting genuine geopolitical analysts, professional managers and savvy investors acquired the necessary reflexes as the increase in the occurrence of such events. No one eliminates the risk of living under constant terrorist threat for several years, as the scourge could not be contained.

In this study, we investigate empirically the impact of terrorist attacks on the stock returns and volatility of the Damascus Securities Exchange Weighted Index. We utilize daily returns of the DSE Weighted Index over the period from March 01, 2011 to October 29, 2015. For the econometric methodology, we employ a General Autoregressive Conditional Heteroskedasticity (GARCH) models based in the GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) models.

Based on the empirical finding of GARCH (1,1), EGARCH (1,1) and TGARCH (1,1) models, we can find the existence of a significance and positive effect for the return at (t-1) on the return volatility of DSE Weighted Index in a threshold of 1%. Additionally, we found that terrorist attacks have a negative impact on the Damascus Securities Exchange Weighted returns and volatility. This impact is significant in the mean and variance equations. Also, we can remark the persistence of volatility in the case of Damascus Securities Exchange Weighted Index.

The rest of this paper is organized as follows: section 2 provides a review of the related literature. Section 3 indicates an overview of the Damascus Securities Exchange Weighted Index. In section 4, we present the econometric methodology based on three GARCH models. We expose the data employed in our study in the section 5. Section 6 shows and analysis the empirical results of the estimation of the conditional heteroscedasticity models. Section 7 concluding remarks.

2. Literature Review

The previous research into the impact of terrorism attacks usually studied with the indirect effects of

terrorism and can be classified into three axes for the main objective of this paper, namely (i) the short-term effect of terrorism attacks on primarily stock markets and (ii) the longer-term implications of terrorism attacks on capital markets.

Enders and Sandler [1] conclude that in Spain, terrorism attacks have a negative impact on Foreign Direct Investments by an average of 13.5% per year over the period from 1975 to 1991, but in Greece, the decrease was 11.9% per year.

Eckstein and Tsiddon [2] showed that terrorism had a negative impact on consumption and that sustained terror would reduce annual consumption per capita by 5% in Israeli economy during the period from 1950 to 2003.

Bloomberg et al. [3] utilize a sample of 177 countries through the period from 1968 to 2000 to examine the impact of terrorism on Growth Domestic Product (GDP). They found that terrorism dejected GDP in a "marked and statistically significant" overall, although the reduction was insignificant for developed (OECD) countries.

Enders et al. [4] find that the 9/11 terrorist attacks had modest effect on US Foreign Direct Investments flows and that terrorism in general has had a little effect on the stock of US Foreign Direct Investments (in OECD countries only).

Chaudhry [5] examines the return and time varying beta effect of 9/11 on 20 American firms. Their empirical results show that the direction of the effect varies according to the firms. Also, they find that not all firms experience an augment in their beta.

Abadie and Gardeazabal [6] use a Global Terrorism Index (produced by the World Research Centre for the years 2003/4) for a cross-section of 110 countries. They find that for a one standard deviation change in terrorism risk, the net stock of a country's Foreign Direct Investments decreased by approximately 5% of Growth Domestic Product.

Chen and Siems [7] examine the impact of 14 terrorist/military attacks on global stock market returns. Their empirical results show that returns on the Dow Jones were not abnormal on the day of terrorist attacks (with the exception of the 9/11 attack, where abnormal returns lasted 40 days) and they find that the impact on major stock market indexes was temporary, lasting usually from 1 to 3 days.

Carrer and Simkins [8] studied the impact of the 9/11 terrorism attacks on airline stock returns. They conclude that while the market was concerned with the increased risk with respect to these stocks, it also differentiated in the sternness of this apportioned risk premium augment on the basis of airlines' cash liquidity position.

Karolyi and Martell [9], who globally investigated terrorist events on firms over the period from 1995 to 2002. Their main empirical results show that stocks of those firms decreased on average by (-0.83%) on the day of the attack and they find that attacks in wealthier, more democratic countries created larger losses of stock market returns.

Arin et al. [10] examine the impact of terrorism events on stock market volatility in Indonesia, Israel, Spain, Thailand, Turkey, and UK through the period from 2002 to 2006. They conclude that terrorism as defined by a daily terror index has a significant effect on stock market returns and volatility. Additionally, they find that the impact of terrorism attacks is more pronounced in the emerging markets.

Chesney et al. [11] investigate empirically the effect of terrorism events on 25 countries over a period of 11 years, relative to the behavior of stocks, bonds and the commodity market. The main finding show that terrorist attacks have a significantly affect on European, American, Swiss, and global markets.

3. Damascus Securities Exchange Weighted Index

On October 01, 2006 Dr. Al Assad, the President of Syrian Arab Republic issued Decree 55 (Stock Exchange Act) establishing a financial market for the trade of securities, known as the Damascus Securities Exchange (DSE). The DSE is a public institution. It is self financing although the setup cost and deficit are largely financed by Governmental loans. The intention is ultimately to transfer the DSE into a shareholding company.

The Damascus Securities Exchange would be controlled and managed by a Board of Directors which consists of 9 members. These nine members would be named by the Prime Minister upon a suggestion from The Syrian Commission on Financial Market and Securities.

The Board is composed by two members who represent two Corporate Firms that issue securities, as members in the Damascus Securities Exchange, two members who represent two Brokerage Firms that are authorized by the Commission, three members who are experienced and have qualifications in Securities Exchange and these are chosen by the Board of Commissioners, a member who represents the Syrian Commission on Financial Market and Securities, and member who represents the Central Bank of Syria.

The Damascus Securities Exchange financial resources consist of the following: Membership Fees or The yearly fees, the trading commissions that the exchange gets through the selling and buying transactions, the amounts that are assigned to the exchange by the government, the donations that the exchange gets from any agency that the Commission approves, the fines that the exchange gets from penalties that occurred, and any other resources approved by the Commission.

Membership of the exchange would be mandatory to the Brokers approved by the Syrian Commission on Financial Market and Securities (except Financial Consultancy Limited Liability Firms), and the Joint Stock companies that gained the acceptance to be listed in the exchange. The membership rules shall define the requirements and the obligations of acquiring the membership.

The Joint Stock companies that are listed in the Damascus Securities Exchange are divided into the following sectors as, Agricultural Sector, Insurance Sector, Banking Sector, Industrial Sector, and Services Sector.

Additionally to equities, the Damascus Securities Exchange will trade Corporate, Governmental and local authority (municipal) bonds. There will also be a provision for the trade of mutual funds (collective investment schemes) and Islamic products (Soukouk). The Damascus Securities Exchange will operate on two tiers as, Main market and Growth market which consist of Growth market A and Growth market B.

All companies listed on the Damascus Securities Exchange will be required to maintain their share registers in electronic form (soft copy). The Damascus Securities Exchange will act as the national central registrar for all securities listed on the Exchange.

Trading takes place at the Damascus Securities Exchange every Sunday, Monday, Wednesday, and Thursday. Initially the trading hours are from 10:30 am tell 1:15 pm in each trading day. This shall increase as the market develops. Trading in equities will be by continuous auction. The exchange in equities will be order driven whereas the market in Governmental Bonds shall be quote driven. Margin Trading, Future contracts and short selling are forbidden in the exchange for now.

Trading is conducted on a central trading floor in Damascus although remote order entry from brokers' offices is available.

The Exchange assures that the Ownership Restrictions that are mentioned in the exchange registers whether they were written or electronic or any documentation issued by it are an evidence of Trading in the securities exchange.

The Damascus Securities Exchange Weighted Index is based on weighting with the market value of companies involved in the calculation of the equation, where each company is given weight as much as its market value represented in the market value of the sample as a whole.

The index sample consists of all the companies listed in the Main market and the Growth market A.

4. Methodology

In this section, we present the econometric methodology used in our paper which based in a various GARCH models, such as GARCH, EGARCH and TGARCH. These models are utilized to assess the effect of 34 terrorist attacks on Damascus Securities Exchange Weighted Index volatilities.

Formally, the return r_t of Damascus Securities Exchange Weighted Index at time t is expressed as follow:

$$r_t = \theta r_{t-1} + \varepsilon_t. \tag{1}$$

Then, we can consider r_t as a return time series measured by the following equal:

$$r_t = \mu + \varepsilon_t \tag{2}$$

Where, μ denotes the expected return and ε_t is a zero-mean white noise. Although of being serially uncorrelated, the series ε_t does not require to be serially independent. Such as, it can present conditional heteroskedasticity. The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model assumes a specific parametric form for this conditional heteroskedasticity. More specifically, we say that $\varepsilon_t \sim$ GARCH if we can write $\varepsilon_t = \sigma_t z_t$, where z_t is standard Gaussian and:

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \tag{3}$$

In addition, leptokurtic returns, the Generalized Autoregressive Conditional Heteroskedasticity model captures other stylized facts in financial time series, like volatility clustering. The volatility is more likely to be elevated at time *t* if it was also high at time *t*-1. One more way of seeing this is noting that a shock at time t-1 also effects the variance at time *t*. However, if $\alpha + \beta < 1$, the volatility itself is mean reverting and it fluctuates around σ .

The Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model assumes a specific parametric form for this conditional heteroskedasticity. More particularly, we consider $\varepsilon_t \sim GARCH$ if we can write $\varepsilon_t = \sigma_t z_t$, where z_t is standard Gaussian:

$$\ln\left(\sigma_{t}^{2}\right) = \omega + \alpha \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \beta \ln\left(\sigma_{t-1}^{2}\right) + \delta\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right).$$
(4)

The Threshold Generalized Autoregressive Conditional Heteroskedasticity model (TGARCH) was introduced for the first time by Glosten et al. [12] that captures asymmetric in terms of negative and positive shocks. In Threshold Generalized Autoregressive Conditional Heteroskedasticity model, it has been showed that positive and negative shocks of equal magnitude have a different effect on stock market return and volatility, which may be attributed to a "leverage effect" [13]. In the same sense, negative shocks are followed by higher volatility than positive shocks of the same magnitude [14]. The conditional variance for the simple TGARCH model is defined by;

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \delta \varepsilon_{t-1}^2 d_{t-1}$$
(5)

Where, d_t takes the value of 1 if ϵ_{t-1} is negative, and 0 otherwise. So "good news" and "bad news" have a different impact. If $\beta > 0$ the leverage effect exists and news impact is asymmetric if $\alpha \neq 0$. Notably, the additional parameters, δ are employed to capture the daily effects.

Then, to assess the effect of terrorism attacks on Damascus Securities Exchange Weighted Index volatilities, we added a new variable denoted "TA" (Terrorism Attacks) in each estimated equal. The variable "TA" takes the value of 1 if in date t we have terrorism attacks in Syria and 0 otherwise. For example, after we added this variable in the equal 1, 3, 4, and 5, we can write:

$$r_t = \theta r_{t-1} + \phi T A + \varepsilon_t \tag{6}$$

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \phi T A \tag{7}$$

$$\ln\left(\sigma_{t}^{2}\right) = \omega + \alpha \left|\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right| + \beta \ln\left(\sigma_{t-1}^{2}\right) + \delta\left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}}\right) + \phi TA$$
(8)

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \delta \varepsilon_{t-1}^2 d_{t-1} + \phi TA.$$
(9)

5. Data

In this paper, we utilize daily closing prices of the principal index in the stock exchange of Syria (Damascus Securities Exchange Weighted Index). The dataset was considered from March 01, 2011 to October 29, 2015, which including a total of 794 observations. We collect

the dataset from the website of the Stock Exchange of Syria. In our study, the Damascus Securities Exchange Weighted Index returns are expressed by ln of the return between two dates (t) and (t-1). The return rt is calculated, as follows:

$$r_t = \ln\left(\frac{p_t}{p_{t-1}}\right) \tag{10}$$

Where, P_t and P_{t-1} are the daily closing prices of Damascus Securities Exchange Weighted Index (DWX) 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 Damascus Securities Exchange Weighted Index daily returns. According to this Table, we can remark that the maximum of DWX is equal to 0.037958 through the period of study. The standard deviation of the variable TA is greater than the standard deviation of the Damascus Securities Exchange Weighted Index daily returns.

For the two statistics of skewness (asymmetry) and kurtosis (leptokurtic), we can observe that the two variables used in our study are characterized by nonnormal distribution. The positive sign of the skewness coefficients indicate that the variable is skewed to the right and it is far from being symmetric for all variables. Also, the Kurtosis coefficients confirm that the leptokurtic for all variables used in this study show the existence of a high peak or a fat-tailed in their volatilities.

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

Table 1. Descriptive Statistics

	DSE	ТА
Mean	-0.000357	0.040302
Median	-0.000741	0.000000
Maximum	0.037958	1.000000
Minimum	-0.021259	0.000000
Std. Dev.	0.007149	0.196791
Skewness	1.237230	4.674879
Kurtosis	8.640519	22.85449
Jarque-Bera	1255.129*	15933.56*
Probability	0.000000	0.000000
Sum	-0.283721	32.00000
Sum Sq. Dev.	0.040529	30.71033
Observations	794	794

Note: This table presents the main statistical features for the Damascus Securities Exchange Weighted Index returns. The data period is from March 01, 2011 to October 29, 2015. (*) indicate a significance threshold at 1%. Source: Elaborated by the authors.

Figure 1 present the evolution of the Damascus Securities Exchange Weighted Index daily return. Then, we can show that the DWX return is very volatile especially in 2011 and 2013 which explain the persistence

of volatilities in the stock market of Syria.



Figure 1. Damascus Securities Exchange Weighted Index over the period from March 01, 2011 to October 29, 2015 (Source: Elaborated by the authors)

The Augmented Dickey-Fuller test, Elliott-Rothenberg-Stock DF-GLS test, Phillips-Perron test, Kwiatkowski-Phillips-Schmidt-Shin test, Elliott-Rothenberg-Stock test, and Ng-Perron test are utilized to test the stationary of the time series of the dataset used in this paper. The results of these two tests are presented in Table 2. From this Table, we can reject the null assumption of non stationary of the Damascus Securities Exchange Weighted Index return. So, we can conclude that the Damascus Securities Exchange Weighted Index return is stationary over the period of study from March 01, 2011 to October 29, 2015.

Tests	In level	In first difference
	statistic	statistic
	(p-value)	(p-value)
Augmented Dickey-	-12.70929	-14.25631
Fuller test	(0.0000)*	(0.0000)*
Elliott-Rothenberg-	-15.35631	-18.72912
Stock DF-GLS test	(0.0000)*	(0.0000)*
Dhilling Downon tost	-12.69916	-67.07843
r mmps-r erron test	(0.0000)*	(0.0001)*
Kwiatkowski-Phillips-	-22.99323	-24.63811
Schmidt-Shin test	(0.0000)*	(0.0000)*
Elliott-Rothenberg-	-14.00293	-15.71002
Stock test	(0.0000)*	(0.0000)*
N. D	-16.11203	-17.82643
ng-rerron test	(0.0000)*	(0.0000)*

Note: This table presents the unit root test for the Damascus Securities Exchange Weighted Index returns. The data period is from March 01, 2011 to October 29, 2015. * indicate a significance level at 1%. Source: Elaborated by the authors.

6. Empirical Results

We present in this section the empirical results of estimation of GARCH models in the case of Damascus Securities Exchange Weighted Index through the period of from March 01, 2011 to October 29, 2015. We use three Generalized Autoregressive Conditional Heteroscedasticity models, as GARCH(1,1), EGARCH(1,1), and TGARCH(1,1), to capture the impact of terrorism attacks on the Damascus Securities Exchange Weighted Index volatility.

Figure 2 and Figure 3 present the Conditional Volatility of Damascus Securities Exchange Weighted Index without and with Terrorism Attacks, respectively, through the period from March 01, 2011 to October 29, 2015. These figures indicate the presence of highly volatility, which implies the existence of time-varying volatilities in the case of the DSE returns. Additionally, we remark that the Conditional Volatility of Damascus Securities Exchange Weighted Index reach their maximum in 2011 and 2013 which correspond to the outbreak of Syrian revolution and the cumulative terrorist attacks doing by the Islamic State of Iraq and al-Sham (ISIS), the Al-Nosra Front, and the Liwa Ahrar al-Sunna, respectively.

From the estimation results of GARCH models without and with terrorist attacks, we can show that in the mean equation the existence of a significance and positive effect for the DSE returns at date (t-1) with a threshold level of 1%. In addition, the GARCH reaction parameter α usually ranges between about 0.05 (for a market that is relatively stable) and about 0.1 (for a market that is relatively stable) and about 0.1 (for a market that is jumpy or nervous). The GARCH persistence parameter β usually ranges between 0.85 and 1, with lower values being associated with higher α . The GARCH volatilities with relatively high α and relatively low β are more 'spiky' than those with relatively low α and relatively high β .

From Table 3, we can show that the results of GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) specifications of DSE returns have a low parameter α (between 0.05 and 0.1) and a highest GARCH persistence parameter β ranges between 0.85 and 0.98 for the two cases; without and with terrorist attacks.

Furthermore, we show that the sum of the above mentioned key coefficients $(\alpha + \beta)$ is very close to unity for the almost all of the DSE returns series implying the persistence of volatility for the two cases; without and with terrorist attacks.

Also, we can remark that terrorist attacks have a negative impact on the DSE returns. This impact is significant with a significance level of 1% in the mean and

variance equations. We can explain this impact by the volatility of DSE returns in the Figure 2 and Figure 3.

By using three Generalized Autoregressive Conditional Heteroscedasticity models, as GARCH(1,1), EGARCH(1,1), and TGARCH(1,1), we can show the highly impact of terrorism attacks on the Damascus Securities Exchange Weighted Index volatility especially through the period of study from March 01, 2011 to October 29, 2015.

Table 5. Results of Estimated Officent Mouch	Table 3.	Results	of Estimated	GARCH Models
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	GARC	CH(1,1)	H(1,1) EGARCH(1,1)		TGARCH(1,1)	
			Mean equation			
θ	0.040630 (0.0000)*	0.374032 (0.0000)*	0.783206 (0.0000)*	0.625512 (0.0000)*	0.990753 (0.0000)*	0.981772 (0.0000)*
φ	-	-0.269203 (0.0000)*		-0.120002 (0.0000)*		-0.295621 (0.0000)*
			Variance equation			
ω	2.22E-07 (0.0000)*	2.24E-07 (0.0000)*	-0.878992 (0.0000)*	0.875761 (0.0000)*	2.26E-07 (0.0000)*	2.28E-07 (0.0000)*
α	0.094929 (0.0000)*	0.095491 (0.0000)*	0.030263 (0.0000)*	0.030088 (0.0000)*	0.011147 (0.0000)*	0.011771 (0.0000)*
β	0.863081 (0.0000)*	0.862563 (0.0000)*	0.956687 (0.0000)*	0.956977 (0.0000)*	0.941753 (0.0000)*	0.941212 (0.0000)*
δ	-		0.007149 (0.0000)*	0.005569 (0.0000)*	-0.027314 (0.5230)	-0.027373 (0.5227)
λ	-	-0.000145 (0.0074)*		-0.000194 (0.0022)*		-0.000154 (0.0092)*
$\alpha + \beta$	0.92	0.92	0.99	0.99	0.95	0.95
R-squared	0.924379	0.905663	0.970043	0.864019	0.895180	0.932284

Note: 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 return of Damascus Securities Exchange Weighted Index (DWX) from March 01, 2011 through October 29, 2015. (*) is statistically significant at the threshold of 1%. (Source: Elaborated by the authors.)



Figure 2. Conditional Volatility of Damascus Securities Exchange Weighted Index without Terrorism Attacks over the period from March 01, 2011 to October 29, 2015 (Source: Elaborated by the authors)



Figure 3. Conditional Volatility of Damascus Securities Exchange Weighted Index with Terrorism Attacks over the period from March 01, 2011 to October 29, 2015 (Source: Elaborated by the authors)

7. Conclusion

In this study, we examine empirically the impact of terrorist attacks on the stock returns and volatility of the Damascus Securities Exchange Weighted Index. We utilize daily returns of the DSE Weighted Index over the period from March 01, 2011 to October 29, 2015. For the econometric methodology, we use a General Autoregressive Conditional Heteroskedasticity (GARCH) models based in the GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) models.

From the estimation finding of GARCH models without and with terrorist attacks, we can show that in the mean equation the existence of significance and positive effect for the DSE returns at date (t-1) with a threshold level of 1%.

In addition, we can find that the results of GARCH (1,1), EGARCH (1,1), and TGARCH (1,1) specifications of Damascus Securities Exchange Weighted Index return and volatility have a low parameter α (between 0.05 and 0.1) and a highest GARCH persistence parameter β ranges between 0.85 and 0.98 for the two cases; without and with terrorist attacks.

We show that the DSE returns series implying the persistence of volatility for the two cases; without and with terrorist attacks. Also, we can remark that terrorist attacks have a negative impact on the DSE returns.

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