THE IMPACT OF NEWS EVENTS ON THE TUNISIAN STOCK MARKET VOLATILITY: A POST-REVOLUTIONARY STUDY

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Abstract

This study examines the impact of political, economic, social and terrorism events on market volatility over the period of the Tunisian revolution from December 1, 2010 to May 29, 2015. Our study is based on daily data of three variable: Tunindex the composite index of the Tunisian stock market, the financial companies' index, and the exchange rate Eur/Tnd, in order to detect the influence of each type of event on these three selected variables. Using an EGARCH model, the empirical evidence highlights that the fourth types of events affect the Tunindex market volatility. In fact, the political, social and terrorism events increase the volatility of the index. However, the economic events diminish this volatility. Furthermore, we notice that only political and social events influence the market volatility of the financial companies. However, exchange rate Eur/Tnd was affected only by economic and social events.

Keywords: Volatility, Event Study, EGARCH Model, Tunisian Revolution
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1. INTRODUCTION

During the last two decades, the movements of asset prices are strongly affected by the financial and political instability periods worldwide (subprime crisis, attack of 11/9/2011 ...).

Also, we note that turbulent phases of financial and economic instability strongly impact the price movements of financial assets and consequently directly influences the extent of market volatility.

The impact of financial or political crises on investor behavior is usually unexpected and inevitable, but they do not affect the same way the price movements of financial securities.

Financial markets are now considered essential to propel economic growth. Political instability strongly affects both the overall economic development and financial markets.

Financial markets are an interesting environment to study the economic effects of political instability, because investors in these markets are generally sensitive to news about the future prospects of economies that are of some importance for financial assets

In Tunisia, the immolation of M. Bouazizi a young vegetable vendor from a small town in Tunisia set himself ablaze in protest of the alleged police corruption and ill treatment. This incident sparked the start of the revolution: it reignited the political activism of the entire region, triggering a revolutionary wave of demonstrations and protests firstly in Tunisia and then elsewhere in the Arab world. These widespread protests and demands for reforms (the so-called "Arab Spring" movements) have led to varying degrees of political changes with rulers being forced from power in some countries along with changes of domestic and foreign policies in many governments.

The fall of the former regime in January 2011 brought about a period of social, political and economic instability throughout the country, further aggravated by the outbreak of civil war in Libya and the deepening debt crisis in Europe. Tunisia experienced then its first recession In 25 years.

The Tunis Stock Exchange managed to stand up relatively well to this extremely difficult national and international environment. The Tunindex, index of reference dropped by just 7.6%[14] after eight years in a row of successive increases. Thus, Investors on the Tunisian financial market are increasingly threatened by the political and economic instability which constitutes a danger to their strategic objectives.

The purpose of this paper is to study the impact of political instability, economic instability and social events on the stock market performance and to examine the relative strength of each event in explaining the changes in stock market performance. The rest of the paper is organized in six sections. Section II focuses on the literature review. Section III focuses on data and methodology. Section IV presents the empirical results and finally section V is devoted to the conclusions.

2. LITERATURE REVIEW

Different research studies were conducted by different scholars to identify those factors which affect the share prices. In this research we will focus on events study and analyzing stock prices behavior due to such events arising in the country. That may

[14] Tunisian Stock Exchange Annual Report 2011 (www.bvmt.com).

be comprised of economic, political, social and terrorism events affecting stock prices.

2.1. Impact of economic events on stock market volatility

Economic news, particularly macroeconomic news, has been identified as one of the drivers of stock returns and causes of financial market fluctuations (Chen et al., 1986; Fama, 1981).

There are several studies that investigate the effect of macroeconomic announcements on the volatility of the domestic financial markets. Cutler, Poterba, and Summers (1988), who study the drivers of U.S. stock market, find that macroeconomic news does affect stock returns. In fact, they show that it is difficult to explain more than one third of the return variance from this source.

Ederington and Lee (1993), on the other hand, find a significant effect of regularly scheduled US macroeconomic announcements on the volatility of the US treasury and foreign exchange futures. Andersen, Bollerslev and Cai (2000) characterizes the volatility in the Japanese stock market based on a 4-year sample of 5-min Nikkei 225 returns from 1994 through 1997. In their study of the Japanese stock market volatility find that the Japanese macroeconomic news announcements explain only 0.1% of variation in the intraday volatility.

According to Boyd et al (2005), Funke and Matsuda (2006) and Hanousek et al (2009, 2011), asset prices and volatility in stock markets react almost instantaneously to macroeconomic news. However, Andersen et al (2007) document asymmetric impacts of good versus bad news on financial market returns and volatilities and generally report a larger impact of bad news than that of good news. In particular, bad macroeconomic news has the traditionally-expected negative equity market impact during contractions, but a positive impact during expansions. This explains the small stock market news reaction effect when averaged across expansions and contractions, as reported in the exiting literature.

By jointly modeling returns and volatilities, Cakan (2012) find that unemployment news has no significant impact on US stock market returns, but instead on stock market volatility. Both unemployment and inflation news surprises also have more impact on volatility during economic recessions than during expansions. Cakan et al (2014) analyze the impacts of US macroeconomic announcement surprises on the volatility of 12 emerging stock markets by employing asymmetric GJR-GARCH model. The model includes both positive and negative surprises about inflation and unemployment rate announcements in the U.S. They find that volatility shocks are persistent and asymmetric.

2.2. Impact of political events on stock market volatility

Abdelbaki (2013) study the impact of political instability, economic instability and external events associated with the Egyptian revolution on the stock market performance. They find that political instability plays an important role in effecting the stock markets' function. However, economic instability came in the second rank.

Mei and Guo (2002) examine the impact of political uncertainty on financial crises using a panel of twenty-two emerging markets. They observe an increased market volatility during political election and transition periods.

Dar, Feng and Chen (2005) analyzed the Taiwan Stock Exchange (TSE) prices for the possible influence due to events of political nature. They find that the reaction of the prices to the event is insignificant because of the uninformative nature of events. Aggrawal et al (1999) explain that different political events become a source of volatility in stock market of different countries.

Chan and Wei (1996) show that favorable political news produce positive returns whereas unfavorable news causes negative returns. They also note that certain type of stocks and sectors are more vulnerable to political risk than the others. Specifically, their results indicate that political news have an impact on stock market volatility mainly through the blue ship (and not the red-ship china-related) shares. Suleman (2012) find that unstable political situations reduced foreign investment in stock market and cause volatility because investors are reluctant to invest in more diverse political conditions.

Döpke and Pierdzioch, (2006) find a poor relationship between political changes and the German stock market. It is also concluded that exchange of Government between political parties does not volatile the stock market. Chau et al (2014) document a significant increase in the volatility of Islamic indices during the period of political unrests whereas the uprisings have had little or no significant effect on the volatility in conventional markets.

Mnif and Kammoun (2015) find that Arab spring has affected the stock market activity. In fact, after the revolution, in almost all MENA countries considered in their sample, an important crisis begins, and the index has not recovered its initial level.

Jeribi and al (2015) study the impact of political uncertainty (resulting from the Tunisian Revolution) on the volatility of major sectorial stock indices in the Tunisian Stock Exchange. Using a FIEGARCH approach to model the Tunisian sectorial indices' volatility dynamics, persistence degree and leverage effect, they find that the shock impact throughout the Revolution period on construction, industries, consumer services, financial services, financial companies indices' sectorial and the TUNINDEX return volatilities have proven to be permanent, while its persistence on the other indices has been discovered to be transitory.

2.3. Impact of terrorism on stock market volatility

Ramiah et al. (2008) examine the effect of terrorist attacks on Japanese Stock Exchange by that how the recent attacks around the world influence different sector of Japanese Stock exchange. 5 major events of terrorism were selected: 9/11, Bali bombing (12th Oct 2002), Madrid bombing March (2004), and London (2005) and Mumbai (2008). The outcome show that the market show negative returns in the short run and due to 9/11 attacks and have weak response towards Bali, Mumbai and London

bombings, while reacts negatively to Madrid terrorist attacks.

Eldor and Melnick (2004) use type of attack and target, number of casualties, and the number of attacks per day for 639 terror attacks between 1990 and 2003 in Israel. They find that suicide attacks had a permanent effect on both the stock and foreign exchange market.

Nikkinen and Vahamaa (2010) through an empirical investigation on the FTSE 100 stipulate that terrorist attacks increase the uncertainty on the stock market and create a remarkable downward trend in expected value.

Chen and Siems (2004) attempt to statistically test the significance of the September 11 attacks on global capital markets by measuring the deviation of index returns from their average. When the return deviation is large and statistically significant, the authors conclude that the market saw the events as important.

Chesney (2010) studied the empirical impact of the terrorism along with some extreme events on the financial market and a data of 25 different countries for 11 years were collected where different terrorist activities took place. The results showed that financial market have significant negative relation to terrorist attacks and catastrophic events.

Sulmen (2012) examined the effect of terrorist attack news on returns and volatility for the Karachi Stock Exchange. They employ the EGARCH model proposed by Engle and Ng (1993) as it allows good and bad news to have a different impact on volatility. Their results indicate that terrorist attack news has negative impact on the returns of all the sector indices. However, news of these events increased the volatility of KSE100 index and financial sector index.

2.4. Impact of social events on stock market volatility

According to Pruitt and Friedman (1986) and Pruitt, Wei and White (1988), boycotts influence stock price. Dinardo and Hallock (2010) emphasize the negative effects of strikes on the stock markets, through an investigation of the U.S. market over the period 1925-1937.

White and Kare (2011) find that consumer boycott announcements are followed by statistically significant decreases in the stock prices of the target firm.

Using data on activist protests of U.S. corporations during 1962–1990, King and Soule (2007) examine the effect of protests on abnormal stock price returns, an indicator of investors' reactions to a focal event. Empirical analysis demonstrates that protests are more influential when they target issues dealing with critical stakeholder groups, such as labor or consumers, and when generating greater media coverage.

Teoh et al (1999), through the analysis of the effect of social movements boycott products of certain companies, on the South African financial market, using an events study; they found a minimal effect on the shares of target companies.

Koku et al (1997), analyzing the impact of social movements on the value of the firm, showed that "the value of target companies increased an average by 0.76% over the day the news became public. Secondly, the value of target companies grew only by 0.55% on the day that the information of the boycott threat became public. However, there is absence of statistically significant difference between the market reaction to boycott and threats of actual boycott. When combined, without distinction between boycotts and threats of actual boycott, the value of target companies increased on average, 0.66%".

Alexakis and Petrakis (1991) have examined the stock market prices behavioral trends in the Greek market. They have discovered that the stock market index behavior is closely associated with the sociopolitical factors.

3. EMPIRICAL STUDY

3.1. Objective

The aim of our study is to analyze the effect of political, economic, social and events related to terrorism during the period of the emergence of the revolution precisely from December 1, 2010 to May 29, 2015 on the Tunisian Financial Market. Based on an autoregressive conditional heteroscedasticity specification ARCH, we study movements on volatility of financial variables.

3.2. Data

To test the change in volatility in time following the occurrence of political, economic, social and events underlying the terrorism, we select three main indexes, the index of financial companies (Indsf), the composite index of the Tunisian Stock Market (Tunindex) and the exchange rate Eur/Tnd:

- DLn Tunindex: Tunindex return measured by its differential logarithm
- DLn Eur/Tnd: Eur/Tnd return measured by its differential logarithm
- DLn Indsf: Indsf return measured by its differential logarithm

Indeed, these three dependent variables are listed daily in the period from 01/12/2010 to 29/05/2015. Data for the Eur/Tnd were collected from the Central Bank of Tunis. While those of Indsf and Tunindex indices were collected from the Tunisian Stock Exchange.

The events are split on four categories: political events, economic events, social events, and events of terrorism. We retain 198 events: 35 political events, 76 economic events, 32 social events and 55 events related to terrorism. The news are collected from electronic newspapers such as (space manager, leader, manager web, reports of the World Bank ...), TV, Radio; during the period from 01/12/2010 until 31/05/2015.

3.3. Methodology

Table 1 (see the Appendix). presents descriptive statistics of the three variables.

In order to test normality, we examine the coefficient of symmetry (skewness) and flattening (kurtosis) and we also use the Jarque and Bera (JB) and the p-value associated with the test statistics for the three variables.

Standard normal distribution should have a skewness of zero and a kurtosis of three. Based on these values we conclude that the data does not follow a normal distribution. In fact, Table 1 shows that the skewness in the case of r_Tunindex and

r_Indsf are negative which indicates a negative skewness indicating that the curve is more concentrated on the left hand side. Indices usually have a weak negative skewness since the stock prices in the long range tend to increase with time. However, r_Eur/Tnd is positive indicating a positive skewness. The kurtosis is up to 14 for which is way too high means the curve has a high peak. There is, thus, excess kurtosis in the index meaning that the distributions are leptokurtic.

One way to confirm whether the data follows a normal distribution is to look at the Jarque - Bera. In this case, with respect to table 1, the p-value of JB is equal to 0 for the three variables, and hence the H0-hypothesis is rejected which means that the data is not normally distributed.

In order to confirm the existence of ARCH/GARCH effect, we use the Arch test presented in table 2. We see from table 2 that the probability associated with Fisher test statistic is below the risk threshold (Prob <0.05), Therefore we accept the hypothesis of the existence of ARCH effect.

3.4. EGARCH Model

Nelson (1991) introduce the Exponential GARCH which is more useful as compared to GARCH because it allows good news and bad news to have a different impact on volatility and it also allows big news to have greater impact on volatility. This model work in two steps. Firstly, it considers the means and secondly, the volatility.

We add a dummy variable in our univariate EGARCH model that take the value 1 on news days, else zero. It is important to note that we measure separately the response of each news category, i.e., our model is estimated independently for each news category. More specifically, the univariate EGARCH model with a dummy variable for stock market indexes is defined as follows:

Mean Equation:

$$r_{x_{i,t}} = \phi_0 + \phi_1 r_{x_{i,t-1}} + \varepsilon_{x_{i,t}} \quad (1)$$

Variance Equation:

$$\text{Log}\,(h^2_{x_{i,t}}) = \zeta + \alpha_1\, g_{x_{,t}}(z_{x_{i,t-1}}) + \beta \log\,(h^2_{x_{i,t-1}}) + \alpha_2\ \text{Dummy} \quad (2)$$

where,

$$g_{x_{i,t}}(z_{x_{i,t-1}}) = (\left|z_{x_{i,t-1}}\right. - \text{E}\left|z_{x_{i,t-1}}\right.) + \delta\, z_{x_{i,t-1}} \quad \text{and } z_{x_{i,t-1}} = \epsilon_{x_{i,t-1}} / \left. h_{x_{i,t-1}}\right| \quad (3)$$

x_i - DLn Tunindex , DLn Eur/Tnd , DLn Indsf
ϕ_{i0} - Constant
$\phi_{i1,2}$, $\alpha_{i1,2}$ - Coefficients
ζ, β, δ - Conditional variance parameters
β_i - Last period effect on conditional variance
α_i - Contribution of the previous period in the explanation of information related to residuals, affecting the volatility of the period.
δ_i - Distinctive effect between bad news and good news. Negative coefficient means that bad news have greater effect on volatility.

The dummy variables are the following:

ev_glob : global event represent total events as a sole dummy variable, it takes 1 in case of event's occurrence and 0 otherwise
ev_soc : social events as a dummy variable, it takes 1 in case of event's occurrence and 0 otherwise
ev_eco : Economic events as a dummy variable , it takes 1 in case of event's occurrence and 0 otherwise
ev_pol : Political events as a dummy variable , it takes 1 in case of event's occurrence and 0 otherwise
ev_terro : events related to terrorism as a dummy variable, it takes 1 in case of event's occurrence and 0 otherwise

4. EMPIRICAL RESULTS

Tables 3, 4, 5, 6, and 7 present the empirical results of the impact of economic, social, political and terrorism news on the three variables: r_Tunindex, r_Indsf and r_Eur/Tnd.

Table 3 shows that global event news dummy α_2 is positive and statistically significant at 1% for the Tunindex (0.400711) and the Indsf (0.201156). That means that all the events recorded during the Tunisian Revolution increase the volatility of the Tunisian stock market. However, we find a positive and non-significant effect of global event on the exchange rate Eur/Tnd. These results corroborate those of Hooper et al. (2008) and those of Angel and Rangel (2005).

After treating the global event news, our series are treated under the effect of the different events separately.

Table 4 describes the coefficient of dummy α_2 in the volatility equation. Results show significant coefficients respectively negative (-0.324736) for the Tunindex and positive (0.180128)*** for the Eur_Tnd. That means, economic events have negative effect on the volatility of Tunindex and a positive effect on the volatility of the exchange rate. In fact, these events increase the volatility of Tunindex. These results corroborate those of Cakan (2012). and refute those of Voth (2001). However, these events decrease the volatility of the Eur_Tnd. These results refute those of Ederington and Lee (1993).

Table 5 and 6 also divulge the coefficient of dummy α_2 in the volatility equation. Results show that both political and social events have positive and statistically very significant effect on Tunindex and Indsf. These results are in line with those of Alexakis and Petrakis (1991) and Chau and al. (2014). The stock market is, in this sense, sensitive

to socio-political climate. In fact, financial investors, in the presence of political and social instability seems to manifest financial reluctance, a preference for liquidity, and adopt a risk-averse behavior. Moreover, while political events have no impact on exchange rate Eur/Tnd, we find a weakly significant effect of social effect on this variable. That means that political instability don't have a profound effect on the currency market. Political news can be viewed by traders as an isolated case of potential political instability and uncertainty, which typically equates to greater volatility in the value of a country's currency

Table 7 reports positive significant effects of terrorism on Tunindex (0.584047) and exchange rate Eur/Tnd (0.248906). Such results are consistent with Suleman (2012). In fact, terrorist attacks can affect both the national and the global economy. The economic consequences can be largely broken down into short-term direct effects; medium-term confidence effects and longer-term productivity effects (Jhosnton and Nedelescu, 2005). However, we find no significant effect (0.123347) on Indsf. That means that financial sector is not sensitive to terrorism events.

The results from the different tables report also that bad news have greater impact than good news. In fact, coefficients related to δ_i is negative for the three variables which means that bad news have more impact than good news. This finding is consistent with Suleman (2012).

5. CONCLUSION

Tunisia's 2010-2011 revolutionary movement was a volcanic reaction to decades of heavy political and social repression against dissenters, human-rights activists and workers, who developed a collective yearning for a just and inclusive political and economic order. However, Tunisia is still facing political uncertainty and economic instability.

This study examines the effect of political, economic, social and terrorism events on stock market volatility over the period of the Tunisian revolution from December 1, 2010 to May 29, 2015.

Our study is based on daily data of three variables: Tunindex the composite index of the Tunisian stock market, the financial companies' index, and the exchange rate Eur/Tnd, in order to detect the influence of each type of event on these three selected variables.

Using an EGARCH model, the empirical evidence highlights that the fourth types of events affect the Tunindex market volatility. In fact, the political, social and terrorism events increase the volatility of the index. However, the economic events diminish this volatility. Furthermore, we notice that only political and social events influence the market volatility of the financial companies. However, exchange rate Eur/Tnd was affected only by economic and social events.

This study could be extended by splitting the news in two categories (good and bad news). We can also study the impact of news on the volatility of major sectorial stock. Furthermore, we can extend our study by studying the impact of news on the volatility of major stock markets in the MENA region and try to distinguish between Islamic and conventional indices. For this we may employ multivariate EGARCH model for studying the volatility. Another topic for further research would be to include some global variables into analysis and explore the effect of stock market volatility to new information from international sources. Finally, we can study the impact of different events on stock prices by using an events study method approach.

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APPENDIX

Table 1. Descriptive Statistics

	r_Tunindex	*r_Eur/Tnd*	*r_Indsf*
Mean	6.39E-05	0.000106	1.53E-05
Median	0.000111	0.000142	0.000136
Maximum	0.0411086	0.011654	0.041627
Minimum	-0.041086	-0.012561	-0.043535
Std. Dev	0.005876	0.002500	0.006081
Skewness	-0.718972	-0.160932	-0.590774
Kurtosis	15.60355	5.412357	14.46879
Jarque-Bera	7415.597	272.9545	6125.832
Probability	0.000000	0.000000	0.000000
Sum	0.070684	0.116873	-0.016867
Sum Sq. Dev	0.038159	0.006905	0.040861
Observations	1,106	1,106	1,106

Table 2. Heteroskesdicity ARCH Test

r_Tunindex			
F-Staistic	219.4736	Prob. F(1.1102)	0.0000
Obs*R-squared	183.3551	Prob. Chi-Square(1)	0.0000
r_Indsf			
F-Staistic	270.7822	Prob. F(1.1102)	0.0000
Obs*R-squared	217.7647	Prob. Chi-Square(1)	0.0000
r_Euro/Tnd			
F-Staistic	54.00842	Prob. F(1.1102)	0.0000
Obs*R-squared	51.57860	Prob. Chi-Square(1)	0.0000

Table 3. Global Event Impact

	r_Tunindex		*r_Indsf*		*r_Eur/Tnd*	
	Coefficient	P_value	Coefficient	P_value	Coefficient	P_value
ϕ_0	1.27E-05	0.9185	-2.80E-05	0.8155	0.000119	0.0835
ϕ_1	0.253084	0.0000	0.16162	0.0000	0.027601	0.4386
C	-3.692638	0.0000	-3.459594	0.0000	-1.891557	0.0000
α_1	0.577562	0.0000	0.569015	0.0000	0.315843	0.0000
δ	-0.075547	0.0128	-0.045910	0.1470	-0.043185	0.0456
β	0.702318	0.0000	0.718646	0.0000	0.863760	0.0000
α_2	0.400711	0.0000	0.201156	0.0021	0.053699	0.2975
R-squared	0.101597		0.078778		-0.000197	
Adjusted R_Squared	0.100782		0.077943		-0.001104	
S.E. of regression	0.005575		0.00542		0.002502	
Sum squared resid	0.034281		0.037641		0.006905	
Log likelihood	4394.985		4336.478		5112.565	
Durbin -Watson stat	1.838363		1.685568		2.036432	
Mean dependent var	6.31E-05		-1.65E-05		0.000104	
S.D dependent var	0.005879		0.006084		0.002501	
Akaike inf criterion	-7.942054		-7.836159		-9.240842	
Schwarz criterion	-7.910331		-7.804437		-9.209120	
Hannan_Quinn criter	-7.930056		-7.824161		-9.228844	
Observations	1,107		1,107		1,107	

Table 4. Economic Event Impact

	r_Tunindex		***r_Indsf***		***r_Eur/Tnd***	
	Coefficient	P_value	Coefficient	P_value	Coefficient	P_value
ϕ_0	-5.65E-06	0.9655	-4.49E-05	0.6994	0.000124	0.0723
ϕ_1	0.250940	0.0000	0.165919	0.0000	0.025105	0.4783
C	-2.453115	0.0000	-2.858304	0.0000	-1.884190	0.0000
α_1	0.479793	0.0000	0.529686	0.0000	0.316788	0.0000
δ	-0.090370	0.0002	-0.050511	0.0636	-0.038503	0.0803
β	0.802280	0.0000	0.768454	0.0000	0.864759	0.0000
α_2	-0.324736	0.0029	-0.095771	0.3865	0.180128	0.0092
R-squared	0.101228		0.078079		-0.000148	
Adjusted R_Squared	0.100413		0.077244		-0.001055	
S.E. of regression	0.005576		0.005844		0.002502	
Sum squared resid	0.034295		0.037669		0.006905	
Log likelihood	4388.563		4334.517		5113.838	
Durbin -Watson stat	1.833912		1.680992		2.030859	
Mean dependent var	6.31E-05		-1.65E-05		0.000104	
S.D dependent var	0.005879		0.006084		0.002501	
Akaike inf criterion	-7.930432		-7.832610		-9.243145	
Schwarz criterion	-7.898709		-7.800888		-9.21423	
Hannan_Quinn criter	-7.918434		-7.820612		-9.231147	
Observations	1,107		1,107		1,107	

Table 5. Political Event Impact

	r_Tunindex		***r_Indsf***		***r_Eur/Tnd***	
	Coefficient	P_value	Coefficient	P_value	Coefficient	P_value
ϕ_0	6.86E-06	0.9536	-5.88E-05	0.5913	0.000125	0.0704
ϕ_1	0.261513	0.0000	0.173421	0.0000	0.024851	0.4881
C	-3.531253	0.0000	-3.622109	0.0000	-1.925678	0.0000
α_1	0.540459	0.0000	0.577615	0.0000	0.312429	0.0000
δ	-0.063105	0.0413	-0.025592	0.4366	-0.040874	0.0680
β	0.715284	0.0000	0.705401	0.0000	0.859483	0.0000
α_2	1.468551	0.0000	1.123031	0.0000	-0.225619	0.0966
R-squared	0.102767		0.080282		-0.000154	
Adjusted R_Squared	0.101953		0.079448		-0.001061	
S.E. of regression	0.005571		0.005837		0.002502	
Sum squared resid	0.034236		0.037579		0.006905	
Log likelihood	4429.233		4354.072		5113.184	
Durbin -Watson stat	1.855456		1.696133		2.030273	
Mean dependent var	6.31E-05		-1.65E-05		0.000104	
S.D dependent var	0.005879		0.006084		0.002501	
Akaike inf criterion	-8.004041		-7.868003		-9.241961	
Schwarz criterion	-7.972319		-7.836281		-9.210239	
Hannan_Quinn criter	-7.992043		-7.856005		-9.229963	
Observations	1,107		1,107		1,107	

Table 6. Social Event Impact

	r_Tunindex		***r_Indsf***		***r_Eur/Tnd***	
	Coefficient	P_value	Coefficient	P_value	Coefficient	P_value
ϕ_0	-1.00E-05	0.9358	-2.04E-05	0.8610	0.000128	00630
ϕ_1	0.241180	0.0000	0.168887	0.0000	0.029772	0.4040
C	-3.809849	0.0000	-3.33776	0.0000	-1.669300	0.0000
α_1	0.592257	0.0000	0.557776	0.0000	0.292238	0.0000
δ	-0.049378	0.1022	-0.037630	0.2530	-0.036573	0.0722
β	0.689684	0.0000	0.727777	0.0000	0.879333	0.0000
α_2	0.967710	0.0000	0.476346	0.0000	-0.261072	0.0338
R-squared	0.099625		0.079000		-0.000334	
Adjusted R_Squared	0.098809		0.078165		-0.001241	
S.E. of regression	0.005581		0.005841		0.002502	
Sum squared resid	0.034356		0.037632		0.006906	
Log likelihood	4400.724		4338.028		5114.110	
Durbin -Watson stat	1.814020		1.687043		2.041101	
Mean dependent var	6.31E-05		-1.65E-05		0.000104	
S.D dependent var	0.005879		0.006084		0.002501	
Akaike inf criterion	-7.952442		-7.838965		-9.243637	
Schwarz criterion	-7.920719		-7.807242		-9.211915	
Hannan_Quinn criter	-7.940444		-7.826967		-9.231639	
Observations	1,107		1,107		1,107	

Table 7. Terrorism Impact

	r_Tunindex		***r_Indsf***		***r_Eur/Tnd***	
	Coefficient	P_value	Coefficient	P_value	Coefficient	P_value
ϕ_0	9.72E-06	0.9384	-3.18E-05	0.7897	0.000120	0.0799
ϕ_1	0.260990	0.0000	0.165125	0.0000	0.030769	0.3824
ς	-3.076957	0.0000	-3.002579	0.0000	-1.589358	0.0000
α_1	0.561539	0.0000	0.538837	0.0000	0.283149	0.0000
δ	-0.089512	0.0014	-0.050268	0.0958	-0.037107	0.0645
β	0.755219	0.0000	0.756771	0.0000	0.887112	0.0000
α_2	0.584047	0.0000	0.123347	0.1180	0.248906	0.0027
R-squared	0.102704		0.077854		-0.000322	
Adjusted R_Squared	0.101890		0.077018		-0.001229	
S.E. of regression	0.005571		0.005845		0.002502	
Sum squared resid	0.034239		0.037678		0.006906	
Log likelihood	4396.692		4334.664		5115.097	
Durbin -Watson stat	1.854407		1.679417		2.043407	
Mean dependent var	6.31E-05		-1.65E-05		0.000104	
S.D dependent var	0.005879		0.006084		0.002501	
Akaike inf criterion	-7.945143		-7.832876		-9.245424	
Schwarz criterion	-7.913421		-7.801153		-9.213701	
Hannan_Quinn criter	-7.933145		-7.820877		-9.233426	
Observations	1,107		1,107		1,107	