The Impact Of Political Instability Driven By The Tunisian Revolution On Stock Market Volatility: Evidence From Sectorial Indices

Salma Zaiane, Faculty of Economics and Management Sciences of Tunis, Tunisia

ABSTRACT

The aim of this paper is to study the impact of political uncertainty, driven by the Tunisian Revolution, on return and volatility of major sectorial stock indices in the Tunisian Stock Exchange. We specifically use EGARCH (1.1) model from 01/12/2010 to 31/08/2016. This model is applied to the daily returns relevant to ten sectorial stock indices and to the Tunisian benchmark index (TUNINDEX). To test the impact of political news on returns and volatility, we divided them into two groups (good and bad news).

Our results show that both of good and bad news have increased the volatility of major selected indices, including the TUNINDEX. However, the return of all indices are not affected by the political news. We then examined the impact of terrorism on the behavior of indices return and volatility. Results show that the Tunisian market responds significantly to terrorist acts. Hence, the return declines and the volatility increase the day of terrorist attacks. Furthermore, results confirm that bad news have stronger effect on the volatility than good news, which reveal the asymmetric effect of volatility.

Keywords: Political Instability; Volatility; EGARCH; Sectorial Indices

1. INTRODUCTION

On January 14, 2011, the Tunisian people went into rage to revolt against dictatorship, repression and despotism. It all started on December 17, 2010, when Mohamed Bouazizi, a young street vendor from Sidi Bouzid, a city located in southern Tunisia, immolated himself in front of the Sidi Bouzid municipal office after a police officer confiscated his cart. This incident deeply shocked the public opinion. Accordingly, it generated a revolutionary wave of protests and street demonstrations, fueled by police repression, corruption, and bad governance, that first sprang from Sidi Bouzid and then spread all over the country.

This revolutionary movement obliged the president Zine El Abidine Ben Ali to step down in January 2011, putting an end to his 23-year reign. Since that day, Tunisia has seen a perpetual political scene; several events have changed its political situation, which has sometimes aggravated by acts of terrorism and assassinations that targeted political leaders.

At one time, the country lost its social peace with a succession of governments lacking the necessary experience and a clear and effective vision of the future. Moreover, it has been subjected to political tensions between Islamists and secular forces, whose reforms and the economy were the first victims. In fact, the political environment has become very unstable following the Tunisian revolution. This political turmoil has threatened investors on the Tunisian financial market because they consider that this unstable environment would constitute a danger to their strategic objectives (Mnif, 2017).

Political instability contributes to lower the economic growth by affecting saving, investments and corporate decisions (Tang & Abosedra, 2014; Aisen & Veiga, 2013). In Tunisia, it is considered as the most damaging constraint to firm growth after the 2011 Jasmine revolution (Matta, 2016). No doubt, after the revolution, the GDP growth slumped sharply to reach -1.9% in 2011. The World Bank (2016) explained in its report [1] on the outlook of the world economy that Tunisia's weak growth is the result of both security problems linked to political assassinations and terrorist acts of 2015.

Besides, the year 2011 remains the most disappointing year in the memory of the Tunisian stock market according to the 2011 annual report of Tunis stock exchange. With the popular uprising that the country lived and the aggravation of The European debt crisis, Tunisia has experienced its first recession since 25 years. The activities of the Tunis stock exchange were hardly affected following the 2011 revolution; the benchmark index TUNINDEX[2] saw its largest cumulative decline at 21% before recovering for the rest of the year and finishing 2011 with a lower value of 7.6%[3]. Tunisian 2011 experiment turns out to have a very crucial impact on the Tunisian stock market (Jeribi, Jarboui & Fakhfekh, 2015). Unfortunately, the political uncertainty, as manifested by instable financial market and sluggish economy, could shake the confidence of national and international investors. In addition, security disruptions, following the proliferation of terrorist attacks, have not helped to keep the green color of the benchmark[4].

The Tunisian revolution was considered the first Arab revolution paving the way for civil apprising known as "Arab Spring". Revolutions swept across Middle East and North Africa; Arab countries like Egypt, Libya, Yemen, Syria and Bahrain, have been plunged into political instability that is nowhere easy, and the Arab post-spring turns out to be a particularly troubled period. Giving the importance of such major political event and its chaotic results on the financial and economic performance, we aim to examine empirically whether political uncertainty, derived from the Tunisian revolution, has an impact on the volatility of major sectorial stock indices in the Tunisian Stock Exchange.

The primary question this study plans to answer is the following: What is the impact of political uncertainty, if existing, on stock market return and volatility?

Political instability was the most damaging obstacle to firms' growth (Matta, 2016). It is also considered as one of the major causes of the weakened economy since the Arab Spring uprisings (Arieff & Humud, 2015). However, almost a few researchers have focused on the impact of political uncertainty on the Tunisian stock market volatility especially at sector indices level. Indeed, the Jasmin Revolution gives Tunisia a growing picture worldwide. In the same time, the country saw a surge in political instability after 2011. Then, it is very important to examine the effects of the revolution outcomes on the Tunisian stock market**.**

Our results show that while both of good and bad news have increased the volatility of major selected indices, bad news have stronger effect on the volatility than good ones. This finding demonstrates the asymmetric effect of volatility. The Results also confirm that the Tunisian market responds significantly to terrorist acts.

The rest of the paper is structured as follows. *Section 2* presents the research background. *Section 3* describes the data, the descriptive statistics and the methodology used. *Section 4* presents and discusses the empirical results. Finally, *Section 5* concludes the paper and summaries the main findings.

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[1] World Bank Annual Report 2016 (http://www.worldbank.org/annualreport.).

[2] The TUNINDEX is the benchmark index of Tunis Stock Exchange. It's the first market capitalization weighted index, it was launched in December 31, 1997, with a base of 1000. It is a yield-based index where the dividends are reinvested (www.bvmt.com.tn).

[3] Tunisian Central Bank annual report, 2012.

[4] On February 06, 2013, the first political assassination took place, targeting the militant Chokri Belaid, the TUNINDEX fell in a day by 3.7%. On March 18, 2015, the Tunis stock exchange had a black Wednesday after the terrorist attack that took place in Bardo Museum, which killed 22 people. As a result, the index fell down by 2.47%. TUNINDEX 20 recorded losses of around 2.8%.

2. LITERATURE REVIEW

2.1 The Arab Spring

Numerous studies have examined the impact of political turmoil fueled by the Arab Spring on stock market volatility. For example, Abdelbaki (2013), using a vector error correction model, shows that political instability following the Egyptian revolution had a strong impact on the movement of the Egyptian stock market indices during the period from March 2011 to November 2011. Indeed, stock index fell sharply; the main index, EGX30, lost about 16% in 26 and 27 January. Similarly, the EGX70 and EGX100 indices decreased respectively by about 24% and 22%.

Chau, Wang and Deesomsak (2014) conduct a study using different GARCH models (GARCH, EGARCH and GJR-GARCH) in order to determine the influence of the "Arab Spring" on stock market volatility in six MENA countries. As a result, they find that the volatility of Islamic indices increases during the period of political turmoil while there is little or no impact on the volatility of conventional indices.

Ahmed (2017) study the impact of political uncertainty on daily data of the EGX market index as well as eight individual sectorial indexes during the period 2011-2014. He uses an event study method as well as a VAR-EGARCH model. His result show that risk returns of the major market sectors are affected by political instability.

Among the studies on the Tunisian stock exchange, Jeribi et al. (2015) use a FIEGARCH model to examine the volatility dynamics of sectorial indices. The model is applied to three sub-periods: before, during and after the Tunisian revolution. Authors find out that the shock impact, during the political uncertainty and unrest period, on the return volatility has been discovered to be permanent in the TUNINDEX and these sectorial indices: financial companies, construction, consumer services, financial services and industries, while its persistence seems to be transitory on the other indices.

Mnif (2017) employs univariate structural unobserved components time series models on monthly data of TUNINDEX from 31/12/1997 to 28/02/2014. The author detected an important increase in the amplitude and the volatility of Tunisian stock market cycles after the Tunisian revolution.

2.2 The Effect of Political Uncertainty on Financial Market Volatility

Political instability is a situation of uncertainty and unrest in the political system specific to each country. It manifests itself in the form of wars, elections, conflicts between political parties or other events that can cause tensions in the ruling regime. These political events have a consequence, which certainly undermines the economic and financial stability of a country.

The widespread phenomenon of political environment instability in several countries across time and its negative impact on their economic performance has triggered the attention of many economists. Cutler, Poterba and Summers (1989) prove that political factors did not significantly affect stock returns in the American stock market. On the other hand, Bittlingmayer (1998) examines political events in Germany from 1880 to 1940 and demonstrate that the major events such as the First World War and the Second World War have a very significant impact on stock prices and its volatility.

Aggarwal, Inclan and Leal (1999) find out that political events contribute to large change in the volatility of 10 largest emerging stock market returns. Kim and Mei (2001) report that the stock market movement of the Hong Kong stock exchange is closely related to political events. These results are consistent also with those of Bailey and Chung (1995) and Boutchkova, Boshi, Durnev and Molchanow (2012) on other stock markets, showing that political uncertainty contributes to financial volatility.

Beaulieu, Essadam and Cosset (2005) carry out a study based on the effect of political risk in Canada on the stock market return and volatility during the period 1990-1996. The authors argue that unfavorable political news increase the volatility of stocks returns, while the favorable ones reduce this volatility. Indeed, the effect of unfavorable political news is higher than the favorable ones. Suleman (2012) study how good and bad political news affect returns and

volatilities of the sectorial index and KSE100 index on the Karachi stock exchange. His results show that good (bad) news increase (decrease) the returns and decrease (increase) the volatility of the selected index.

Khalid and Rajaguru (2010) study the impact of both positive and negative political shocks on the Pakistan financial markets using high frequency data from currency, stock and money market. By employing a Markov Switching process, they find that some domestic and international events cause changes in market volatility. El-Chaarani (2015) investigate the effect of Lebanese political news announcements on Beirut Stock Exchange (BSE) returns and volatility over the period 2005 - 2014. Using GARCH, EGARCH and ARCH models, the results show that good and bad political news have a significant effect on BSE returns. This effect is positive for the good news and negative for the bed news.

Lubos and Veronesi (2013), using the policy uncertainty index of Baker, Bloom and David (2012) as proxy for political uncertainty, argue that the effect of political uncertainty on volatility should be stronger in a weaker economy. Dimitrios, Vortelinos and Shrabani (2016) conduct a study using a sample composed of 66 countries and 20 political risk indicators. The authors find that greater political risk imposes higher volatility in North America markets, Greece, Africa-Asian markets and other regions**.**

Dimic, Orlov and Piljak (2015) study the relationship between political risk and stock return across developed, emerging, and frontier markets. To measure the political risk variable, they use data from the International Country Risk Guide (ICRG). Following Bekaert, Harvey, Lundblad and Siegel (2014), the composite political risk rating is divided into four subgroups: Government Actions, Quality of Institutions, Democratic, Conflicts, and Tendencies. As a result, authors find out that Government actions are considered as the main source of political risk and have negative impact on the stock returns in the three market categories.

Günay (2016) demonstrate that internal political risk is an important factor in explaining breaks and regimes in the return volatilities of the benchmark index of Turkish stock market (BIST 100 index) over the period 2001-2014. They conclude that the Turkish stock market responds to political events. However, the effect is less important than in the past. Another study on the Turkish stock market done by Tuncay (2017) reveals that expected returns are significantly affected by the risks of government stability, military involvement in politics, external conflicts, and internal conflicts.

Essaddam and Karagianis (2014) study the effect of terrorism on stock return volatility of American firms targeted by terrorist attacks. They find that risk is an important factor when it comes to explain the stock market volatility of American firms. Drakos (2010) explore the effect of terrorism on daily stock returns for a sample of 22 countries in which many terrorist activities took place in the period from 1994 to 2004. The results suggest that terrorism induces the decrease of returns the day when a terrorist attack occurs. Chesney, Karaman and Reshetar (2011) offer more evidence of the impact of events related to terrorism on financial markets. The authors use three different methods: an event-study approach, a non-parametric methodology, and a filtered GARCH–EVT approach, to study the effect of 77 terrorist events that occurred in 25 countries. Results confirm that the majority of the events had a negative impact on financial markets.

A growing body of literature has documented the negative effects of political turmoil on a sample range of macroeconomic variables, including, GDP growth, foreign direct investment, public expenditures, taxation, debt and inflation. For example, Julio and Yook (2016) use the timing of national elections as a proxy for exogenous variation in political uncertainty; they find that political uncertainty affected negatively the foreign direct investment flows (FDI) from the U.S. parent firms to their affiliates in 43 countries. Aisen and Veiga (2013), using the GMM system estimator on a panel of 169 countries, find out that political instability lead to sink growth rates of GDP per capita. Lehkonen and Heimonen (2015) studied 49 emerging financial markets using two-panel data approach, pooled OLS and GMM system. Their research demonstrate that lower political risks are linked with higher returns. Furthermore, Bill, Iftekhar and Zhu (2014) stipulate that changes in the political environment inflict additional costs on the loan contract of U.S firms. They reveal that political uncertainty, generated by U.S presidential election, has a significant effect on increasing the cost of corporate bonds. Smales (2016) examine the impact of political uncertainty, surrounding the Australian federal election cycle, on financial market and find that implied volatility of both equity and bond options rises around the poll result.

From this theoretical debate, we conceive the following hypotheses:

H1: Political uncertainty affect the volatility of stock market indices.

H2: The favorable and unfavorable political news do not affect in the same way the volatility of stock market indices.

H3: Terrorist events lead to increase the volatility of stock market indices.

3. METHODOLOGY

In order to investigate the impact of political news on the volatility of stock index on the Tunisian stock exchange, we choose a non-parametric asymmetric model, an extension of the GARCH model, which is the EGARCH model (q, p). Nelson (1991) was the first to introduce the EGARCH model. In this model, the conditional variance σ_t^2 responds asymmetrically to positive and negative innovations. This model makes no restriction on the non-negativity of its parameters (q, p). The EGARCH model is more useful than GARCH. Indeed, a positive shock of returns leads to a lower volatility than a negative shock. The EGARCH model differs from the GARCH model:

- First, good and bad news have different impacts on volatility in the EGARCH model. However, they have the same impacts in the GARCH model.
- Second, important news has greater impact in the EGARCH model than in the standard GARCH model. We chose the EARCH (1, 1) model since it makes it possible to capture the asymmetric responses of the shocks to the volatility.

$$\log(\sigma_t^2) = \alpha f_t(z_{t-1}) + \beta \log(\sigma_{t-1}^2)$$

$$f_t(z_{(t-1)} = (|z_{t-1}|) - E|z_{t-1}| + \gamma\, z_{t-1}$$

$$z_{t-1} = \epsilon_{t-1}/\sigma_{t-1}$$

Its coefficients, β, α, and γ are not constrained to be non-negative, β: This coefficient measures the persistence of volatility; Past volatility is reflected in the conditional variance, if β is statistically significant and positive, this means that positive change in index returns is associated with more positive changes and vice versa. α: This coefficient measures the effect of the previous period in all information set and explains the impact of past standardized residuals on current volatility. γ: The coefficient of the asymmetric effect; If γ is statistically significant and negative, this means that negative shocks have a greater impact on volatility than positive shocks of equal amplitude, indicating the existence of a leverage effect.

To measure the impact of political news on return and volatility, we introduce a dummy variable that takes the value 1 on the day of occurrence of an event, 0 otherwise. More specifically, the EGARCH model with a dummy variable is defined as follows: This model operates in two stages: on the one hand, it considers the return equation and, on the other hand, the equation of the conditional variance.

$$r_{Index,t} = \phi_0 + \phi_1\, r_{Index,t-1} + \theta\, \varepsilon_{Indext-1} + \phi_2 \text{Dummy} + \varepsilon_{Index,t} \tag{1}$$

$$\log(\sigma_{Index,t}^2) = \omega + \alpha_1\, g_{Index,t-1}(Z_{ndex,t-1}) + \beta \log(\sigma_{Index,t-1}^2) + \alpha_2\, Dummy \tag{2}$$

It is important to mention that the response of each category of news are measured separately. Then, we estimate our model independently for each group of news.

4. DATA AND DESCRIPTIVE STATISTICS

The data is collected from the Tunis stock exchange website[5]. It consists of the TUNINDEX index and ten sector indices, which are: Financial companies, Financial services, Consumer services, Industries, Raw materials, Distribution, Banks, goods and consumption, Construction and building care items, and Automobiles and car parts. For both TUNINDEX index and the sectorial indices, the data ranges from December 1, 2010 to August 31, 2016 consists of 1488 observations. The software used in the study is E-views 9. The daily return series are generated as follow,

$$r_t = LOG(p_t/p_{t-1}) \tag{3}$$

Where r_t is the return on time t and p_t and p_{t-1} are the closing index prices at time t and t-1 respectively.

The different graphs in the appendix show the evolution of returns of the different indices throughout the studied period. Summary statistics for our returns series of TUNINDEX and the different sector indices are presented in Table 1.

Table 1. Descriptive Statistics

	TUNINDEX	**Financial services**	**Financial companies**	**Consumer services**	**Raw materials**	**Industries**
Mean	1.98E-05	-1.87E-05	8.07E-06	-0.000124	-0.000120	-0.000252
Median	5.21E-05	8.21E-05	1.34E-05	-0.000375	-1.03E-05	-0.000911
Maximum	0.041086	0.039203	0.041627	0.036829	0.044540	0.036582
Minimum	-0.041439	-0.045656	-0.043535	-0.052119	-0.043052	-0.043266
Std. Dev.	0.005595	0.007211	0.005781	0.007672	0.008574	0.009171
Skewness	-0.586933	-0.430151	-0.449136	-0.296148	0.186555	0.281860
Kurtosis	15.21942	8.972647	14.25674	8.806000	5.843880	5.620717
Jarque-Bera	8928.507	2157.448	7555.629	2018.082	487.4417	425.7667
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	0.028166	-0.026595	0.011477	-0.176164	-0.170543	-0.357988
Sum Sq. Dev.	0.044476	0.073893	0.047496	0.083642	0.104454	0.119520
Observations	1488	1488	1488	1488	1488	1488

	Distribution	**Banks**	**Construction and building care items**	**Goods and consumption**	**Automobiles and car parts**
Mean	-3.57E-05	1.18E-05	-0.000329	0.000467	-0.000613
Median	-0.000409	-9.00E-05	-0.000973	-0.000196	-0.001007
Maximum	0.043712	0.042064	0.041749	0.052771	0.048801
Minimum	-0.053407	-0.043589	-0.045696	-0.048695	-0.053518
Std. Dev.	0.008032	0.006219	0.010608	0.009793	0.012356
Skewness	-0.238759	-0.283664	0.380018	0.378762	0.190670
Kurtosis	8.917244	11.98437	5.354411	7.069008	4.539406
Jarque-Bera	2088.077	4801.670	362.6636	1014.992	149.0250
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	-0.050762	0.016783	-0.467862	0.664433	-0.871244
Sum Sq. Dev.	0.091675	0.054958	0.159901	0.136281	0.216949
Observations	1488	1488	1488	1488	1488

Table 1 shows that the mean value of the TUNINDEX return is 0.000198. The standard deviation is 0.005595. The skewness is about -0.59, which indicates a negative skewness supposing that the curve is more concentrated on the left hand side. The kurtosis is 15.21, which is too high. This means that the curve has a high peak. Thus, excess kurtosis in the index means that the distributions are leptokurtic. The Jarque-Bera is 8928.507 with a p-value of 0. We can then

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[5] http://www.bvmt.com.tn/

conclude that the data does not follow a normal distribution. Table 2 shows also details of the descriptive statistics of the different sectors. All mean returns are negative except for the financial companies and banks sectors. The skewness of the series indicates that the majority of the series has a negative skewness. In addition, all the series reject the H0-hypothesis for Jareque-Bera test confirming that they are not normally distributed.

In our study, we also considered the political news as a measure of political risk. These news are subdivided into two groups: good and bad political news. In fact, after a careful reading, we collected 267 news/events in total: 135 good news and 132 bad news. We have put together all the news related to politics, which include mainly elections, agreements between political parties, the work of the constituent assembly, the conflicts between the politicians and the army, and terrorist attacks and assassinations...

5. EMPIRICAL RESULTS

In order to investigate the best-fit model for the data, according to Akaike information criterion (AIC) and Schwarz information criterion (SIC), we use the linear models of TUNINDEX and the selected sectors with different lags. Then, we justify the selection of EGARCH models. In fact, we conclude that ARMA (1,1) model is the best fit model in most of the series in order to capture the first movement.

5.1 The Impact of Favorable Political News on Stock Market Return and Volatility

The empirical results of the impact of favorable political news on the returns and volatility of the selected stock market indices are presented in Table 2.

Table 2. Estimation results from ARMA-EGARCH with Good News

	TUNINDEX	Financial services	Financial companies	Consumer services	Raw materials	Industries
ϕ_0	2.96E-05	-0.000285	-2.18E-06	-0.000224	-0.000185	-0.000904***
ϕ_1	0.416971***	-0.556472	0.310877**	0.361361	-0.758227***	-0.295513*
θ	-0.181*	0.575747	-0.151511	-0.291622	0.724576***	0.436728***
ϕ_2	-0.000107	0.000379	-0.000175	0.000218	-0.000321	0.000773
ω	-2.950***	-0.689780***	-2.761696***	-0.985266***	-1.124361***	-3.976813***
α_1	0.465559***	0.202083***	0.490860***	0.250987***	0.232300***	0.432373***
γ	-0.091472***	-0.057400***	-0.044140*	-0.020985	0.026058*	-0.055192*
β	0.762090***	0.947285***	0.778570***	0.919125***	0.901343***	0.619534***
α_2	0.323913***	0.055216*	0.236027***	-0.026269	0.031143	0.280196***

	Distribution	Banks	Construction and building care items	Goods and consumption	Automobile and car parts
ϕ_0	-7.19E-06	-4.88E-05	-0.001049***	0.000230	-1.22E-05
ϕ_1	0.961640***	0.393739***	-0.260879	0.489552*	0.967677***
θ	-0.959525***	-0.260263	0.387553*	-0.412739*	-0.970494***
ϕ_2	-3.77E-05	-2.98E-05	0.000444	-0.000176	-0.000119
ω	-1.388967***	-2.524878***	-3.316990***	-3.659573***	-1.470885***
α_1	0.304272***	0.487451***	0.363440***	0.527052***	0.298186***
γ	-0.011133	-0.034048	-0.042796	0.061153**	-0.007672
β	0.881397***	0.797512***	0.672604***	0.660138***	0.862411***
α_2	-0.036877	0.267166***	0.285432***	0.530148***	0.221930***

Notes: This table reports the estimates from the following ARMA-EGARCH model :

$r_{Tunindex,t} = \phi_0 + \phi_1 \, r_{Tunindex,t-1} + \theta \, \varepsilon_{Tunindex,t-1} + \phi_2 \text{Dummy} + \varepsilon_{Tunindex,t}$

$\log(\sigma^2_{Tunindex,t}) = \omega + \alpha_1 \, g_{Tunindex,t-1}(Z_{Tunindex,t-1}) + \beta \log(\sigma^2_{Tunindex,t-1}) + \alpha_2 \, Dummy$

We report the estimates for ARMA-EGARCH return and volatility for TUNINDEX and sectorial indices. The coefficients measuring the effect of dummy variable used as a proxy for the good political news on Tunisian stock markets' returns and volatilities are also reported. Significant coefficients are denoted with ***, **, and * on 1%, 5% and 10% significance level respectively.

We note from table 2 the absence of a significant effect of the favorable political events on the returns of all the stock indices, the coefficient ϕ_2 of the variable Dummy is not significant. This result contradicts the work of Suleman (2012), who found a significant positive impact of good political news on the returns of both sectorial indices and the benchmark index, KSE 100, of the Pakistani Stock Exchange. Moreover, the volatility dynamics show that the dummy variable coefficient α_2, described in the conditional variance equation (2), is very large and strongly significant at the 1% threshold for Consumers goods index (0.530148***), TUNINDEX (0.323913***), Construction and building care items (0.285432***), Industries index (0.280196***), Banks index (0.267166***) and Automobiles and car parts index (0.221930 ***) in comparison with other sectors. When comparing with these indices, the Financial Services sector index has the lowest coefficient with a low threshold of significance (0.055216 *). This result can be explained by the fact that the financial sector depends more on the economic news rather than the political ones. Besides, the favorable political news do not affect the volatility of the Consumer services, Raw materials, and Distribution sectors.

Table 2 also reports the volatility asymmetry, which is negative for some sectors including the TUNINDEX, because of the leverage effect. However, this volatility asymmetry for Materials (0.026058*) and Consumer goods (0.061153**) is positive, showing the absence of the leverage effect in these sectors. In addition, negative asymmetry indicates that the variance increases more after negative than after positive news.

Besides, the persistence parameter β is also presented in Table 2, which is large and very significant for all sectors selected, including the TUNINDEX (0.762090***), Financial Services Index (0.947285***), Consumer Services Index (0.919125***). This implies that the variance moves slowly through time.

We also note that the β coefficients for the TUNINDEX (0.762090***), Consumer goods index (0.660138***) and Construction and building care items index (0.672604***) are quite low as compared to other sectors with coefficients more than 0.80 and 0.90. We conclude that the sectors which respond the most towards favorable political news, ie, increase in volatility, have low β, such as TUNINDEX, Consumer good index and Construction and building care items index.

In line with Suleman (2012), the time period needed for shocks in order to reduce to one half of the original size is defined as $\ln(0.5)/\ln(\beta)$. It is approximately 2.55 days for TUNINDEX, 12.80 days for Financial services index and 1.45 days for Industries sector index. This implies that the shocks persist 2.55, 12.80 and 1.45 days for TUNINDEX, Financial services and Industries sector index respectively. If the persistence of shocks in the conditional variance is shorter, this implies an increase in the volatility.

Suleman (2012) explains that the extent to which negative innovations increase volatility more than positive innovation is defined as $|-1+\gamma|/(1+\gamma)$, which is about 1.2 times for TUNINDEX, 1.12 times for Financial services, which corresponds to the maximum in all the sectors and 0.88 times for Consumers goods sector index, which correspond to the minimum in all the sectors. For example, asymmetry effect is about 1.2 for TUNINDEX. This means that the negative impact is 1.2 times more than the positive impact on the TUNINDEX.

5.2 The Impact of Unfavorable Political News on Stock Market Return and Volatility

The empirical results of the impact of unfavorable political news on the returns and volatility of the selected stock market indices are presented in Table 3.

Table 3. Estimation results from ARMA-EGARCH with Bad News

	TUNINDEX	Financial services	Financial companies	Consumer services	Raw material	Industries
ϕ_0	4.74E-05	3.40E-05	-1.39E-06	-0.000167	-3.85E-05	0.000788***
ϕ_1	0.358498***	-0.106343	0.314192*	0.275536	0.469848	-0.282959*
θ	-0.125815	0.135970	-0.166702	-0.208873	-0.497387	0.422546***
ϕ_2	-0.000610	-0.001146*	-3.68E-05	-0.000701	-0.000392	-0.000572
ω	-2.818218***	-0.339126***	-2.676188***	-1.072764***	-1.042014***	-3.809146***
α_1	0.468758***	0.124244***	0.476659***	0.261955***	0.225023***	0.425557***
γ	-0.075969***	-0.045939***	-0.039200*	-0.014148	0.026795*	-0.061043**
β	0.775607***	0.976297***	0.78650***	0.913003***	0.909935***	0.636022***
α_2	0.445165***	0.054795**	0.294403***	0.169402***	0.098777*	0.240212***

	Distribution	Banks	Construction and building care items	Goods and consumption	Automobile and car parts
ϕ_0	-0.000124	-5.66E-05	-0.000927**	0.000262	5.26E-06
ϕ_1	0.371153	0.309826*	-0.224551	0.426399	0.970333***
θ	-0.306338	-0.178677	0.355591*	-0.373628	-0.975556***
ϕ_2	-0.000582	-4.20E-05	-0.000684	-0.000754	-0.000318
ω	-1.269169***	-2.536812***	-3.114121***	-3.423058***	-1.728113***
α_1	0.285341***	0.480763***	0.361677***	0.561504***	0.332144***
γ	-0.012644	-0.035559*	-0.051172**	0.059946**	-0.007255
β	0.893967***	0.795628***	0.693300***	0.685406***	0.835433***
α_2	0.157252***	0.246963***	0.191645***	0.398436***	0.131525*

Notes: This table reports the estimates from the following ARMA-EGARCH model :

$$r_{Tunindex,t} = \phi_0 + \phi_1\, r_{Tunindex,t-1} + \theta\, \varepsilon_{Tunindex,t-1} + \phi_2 \text{Dummy} + \varepsilon_{Tunindex,t}$$
$$\log(\sigma^2_{Tunindex,t}) = \omega + \alpha_1\, g_{Tunindex,t-1}(Z_{Tunindex,t-1}) + \beta \log(\sigma^2_{Tunindex,t-1}) + \alpha_2\, Dummy$$

We report the estimates for ARMA-EGARCH return and volatility for TUNINDEX and sectorial indices. The coefficients measuring the effect of dummy variable used as a proxy for the good political news on Tunisian stock markets' returns and volatilities are also reported. Significant coefficients are denoted with ***, **, and * on 1%, 5% and 10% significance level respectively.

Starting to analyze returns equation (1), Table 3 shows that the results are similar to those found for the favorable news, except for the coefficient ϕ_2 of the dummy variable for the Financial services sector index (-0.001146 *), which is very low and negatively significant at the 10% threshold. This implies that the returns of Financial services sector are negatively affected the day when bad political news occurs. This is not the case of the other sector indices as well as for the TUNINDEX.

Concerning the impact of unfavorable political news on volatility, results show that unfavorable news increase volatility in all the cases including TUNINDEX. This is reflected by the coefficient α_2 of the dummy variable in equation (2) of the conditional variance. In fact, this coefficient is very significant for TUNINDEX (0.445165***), Financial companies index (0.294403***), Consumer services index (0.169402***), Industries Index (0.240212***), Distribution Index (0.157252***), Bank Index (0.246963***), Construction and building care items (0.191645***), and Consumer goods index (0.398436***). Meanwhile, it is moderately significant in the Financial services sector (0.054795**). However, the α_2 is weakly significant for the Raw Materials and Automobiles and car parts sectors respectively of (0.098777*) and (0.131525*).

Table 3 also presents the volatility asymmetry, which is negative in the majority of sectors including TUNINDEX, confirming the leverage effect. This result is in line with those of Fakhfekh, Jeribi, and Hachicha (2015). In addition, negative asymmetry implies that the variance increases more after negative than after news. However, in case of Raw materials and Consumer goods, the asymmetry is positive proving the absence of the leverage effect. Furthermore, persistence parameter β is very large in most of the cases. This finding implies that the variance moves slowly through time. On the other hand, the β of the Industries sector is the lowest as compared to other sectors. These results support those of Suleman (2012). Indeed, the author finds the β of the Industries sector on the Pakistan Stock Exchange is the lowest as compared to other sectors.

In line with Suleman (2012), the time period needed for shocks in order to reduce to one half of the original size is defined as $\ln(0.5)/\ln(\beta)$. It is approximately 2.73 days for TUNINDEX, 28.89 days for Financial services index and 1.53 days for Industries sector index. This implies that the shocks persist 2.73, 28.89 and 1.53 days for TUNINDEX, Financial services and Industries sector index respectively. If the persistence of shocks in the conditional variance is shorter, this reveals an increase in the volatility.

Suleman (2012) explains that the extent to which negative innovations increase volatility more than positive ones is defined as $|-1+\gamma| / (1+\gamma)$, which is about 1.16 times for TUNINDEX, 1.13 times for Financial services, which corresponds to the maximum in all the sectors and 0.89 times for Consumers goods sector index, which correspond to the minimum in all the sectors. For instance, asymmetry effect is about 1.13. This means that the negative impact is 1.13 times more than the positive impact on the TUNINDEX.

Besides, we note that the favorable political news have no effect on the volatility of the following sectors: Consumer services, Raw materials and Distribution, more precisely the coefficient α_2 of the dummy variable is not significant. On the other hand, the results change in the second case. In fact, the unfavorable political news have increased the volatility of these sectors. The coefficient $\boldsymbol{\alpha_2}$ is highly significant for Consumer services (0.169402 ***), Distribution (0.157252 ***) and significant at the threshold of 10% for the Raw materials sector (0.098777 *). In addition, the impact of unfavorable political news is stronger on TUNINDEX (0.445165 ***) than the impact of favorable political news (0.323913 ***). Besides, we notice from Table 2 and Table 3 that the asymmetry for unfavorable news is more important than for favorable news. This finding confirms that bad news has more impact than good news. As a result, we conclude that the magnitude of the negative political news is more important than the positive ones on the volatility. This is consistent with those of Kim and Mei (2001) and Suleman (2012). According to El-Chaarani (20015), this would lead investors to avoid the regret feeling by following the tendency of the market. The results confirm our first and second hypothesis (H1 and H2). Indeed, political uncertainty affects the volatility of stock market indices, likewise favorable and unfavorable political news do not affect in the same way the volatility of stock market indices.

5.3 The Impact of Terrorism Events on Stock Market Return and Volatility

The empirical results of the impact terrorism events on stock market return and volatility are presented in Table 4.

Table 4. Estimation results from ARMA-EGARCH with news related to terrorism

	TUNINDEX	Financial services	Consumer services	Raw materials	Industries
ϕ_0	6.67E-05	2.92E-05	-0.000215	-0.000141	-0.000624**
ϕ_1	0.295280***	0.302333**	0.081861	-0.097838	-0.273624*
θ	-0.061331	-0.152418	-0.015996	0.059737	0.414898***
ϕ_2	-0.001721**	-0.000516	-0.001752**	-0.001646	-0.003075***
ω	-2.999920***	-2.481714***	-1.195685***	-1.215466***	-3.542061***
α_1	0.531042***	0.478744***	0.301061***	0.256038***	0.482379***
γ	-0.078649***	-0.045421**	-0.021643	0.018466	-0.064222**
β	0.762804***	0.803412***	0.903535***	0.893351***	0.666577***
α_2	0.752005***	0.311888***	0.348264***	0.012657	0.162886*

	Distribution	Banks	Construction and building care items	Goods and consumption
ϕ_0	-0.000150	-5.13E-05	-0.000876**	0.000356
ϕ_1	0.249813	0.225391	-0.271662	0.013662
θ	-0.187985	-0.091487	0.395888**	0.034283
ϕ_2	-0.001394*	-0.000390	-0.003479***	-0.003771***
ω	-1.463581***	-2.730714***	-2.994397***	-3.420109***
α_1	0.325503***	0.525105***	0.410989***	0.580303***
γ	-0.017393	-0.039698*	-0.055301**	0.051843**
β	0.877372***	0.778829***	0.708006***	0.686939***
α_2	0.345017***	0.262735***	0.021775	0.692582***

Notes: This table reports the estimates from the following ARMA-EGARCH model :

$r_{Tunindex,t} = \phi_0 + \phi_1 r_{Tunindex,t-1} + \theta \varepsilon_{Tunindex,t-1} + \phi_2 Dummy + \varepsilon_{Tunindex,t}$

$\log(\sigma^2_{Tunindex,t}) = \omega + \alpha_1 g_{Tunindex,t-1}(Z_{Tunindex,t-1}) + \beta \log(\sigma^2_{Tunindex,t-1}) + \alpha_2 Dummy$

We report the estimates for ARMA-EGARCH return and volatility for TUNINDEX and sectorial indices. The coefficients measuring the effect of dummy variable used as a proxy for the good political news on Tunisian stock markets' returns and volatilities are also reported. Significant coefficients are denoted with ***, **, and * on 1%, 5% and 10% significance level respectively.

Table 4 illustrates the empirical results of the impact of terrorism on the returns and volatility of the selected stock market indices. We note that the terrorist events affected negatively the returns of the majority of the selected sectorial indices, as well as the TUNINDEX. The coefficient ϕ_2 of the dummy variable is negative and statistically significant for the following index, TUNINDEX (-0.00172**), Consumer services (-0.001752**), Industries (-0.003075***), Distribution (-0.001394*), Construction and building care items (-0.003479***), Consumer goods (-0.003771***). Thus, political events diminish the returns of these indices. This result is consistent with those of Drakos (2010), who find that terrorist activity leads to significant lower returns the day of occurrence of the terrorist attack.

Then, we focus on the impact of terrorist events on stock market volatility, described in equation (2). Our results are still relevant when considering volatility. The coefficient α_2 is positive and statistically significant for all the following indices, TUNINDEX (0.752005***), Financial services (0.311888***), Consumer services (0.348264***), Industries (0.162886*), Distribution (0.345017***), Banks (0.262735 ***), and goods and consumption sector (0.692582***). Hence, terrorist events increase the volatility of stock index. The volatility of the sectorial index of Raw materials and Construction and building care items are not affected by terrorism. Our results are in agreement with the work of Black (1976). Using the EGARCH model, the author find that volatility in the stock market tends to increase after negative returns and tends to decline after positive returns. This confirms our third hypothesis (H3). In the same line, this result is consolidated with the work of Essaddam and Karagianis (2014) who find that the volatility of American companies' returns increased by the day an act of terrorism has occurred. In fact, terrorist events decrease returns of stock market indices. Besides, market volatility is positively affected by the facts of terrorism, which induce its increase.

6. CONCLUSION

This paper examines a crucial question concerning the political uncertainty literature as whether such uncertainty affects the stock market volatility in Tunisia after the Jasmin revolution. Our results are in line with the assumption that political uncertainty contributes to financial volatility. We measured the political uncertainty by political news/events. These events are split in two main groups: favorable and unfavorable ones.

Our results show that both of good and bad political news increase the stock market indices' volatility on the Tunisian stock market. However, the impact of bad news on the volatility is stronger than that of the good ones for all sectorial indices. Indeed, a higher or lower intensity depends on the nature of the political event. This research explains also how terrorism activity causes a decrease in stock market returns and an increase in stock market volatility.

In general, the findings are essential in understanding how political uncertainty affect the stability of the Tunisian stock market. They are also important for both individual investors and market regulators. In fact, they help them to understand how to reduce portfolio risk and increase returns. Moreover, financial institutions and institutional investors should take in consideration the political risk factors when choosing their diversification strategies. In fact, these strategies can constitute a potential hedge against future political and terrorism events.

This research can be extended by including some micro and macro-economic indicators such us inflation and economic growth, income or nature of political regime. We can also conduct an event study and examine political news impact on stock market volatility.

AUTHOR BIOGRAPHY

Salma Zaiane, Associate Professor in Finance from the Faculty of Economics and Management Sciences of Tunis, Tunis – Tunisia. Received Ph.D. in Management sciences (Finance) from Faculty of Economics and Management Sciences of Tunis (FSEGT), Tunis – Tunisia. Her main research interests are related to financial markets, Behavioral finance, Islamic and conventional finance and corporate governance. E-mail: Zaiane_salma@yahoo.com
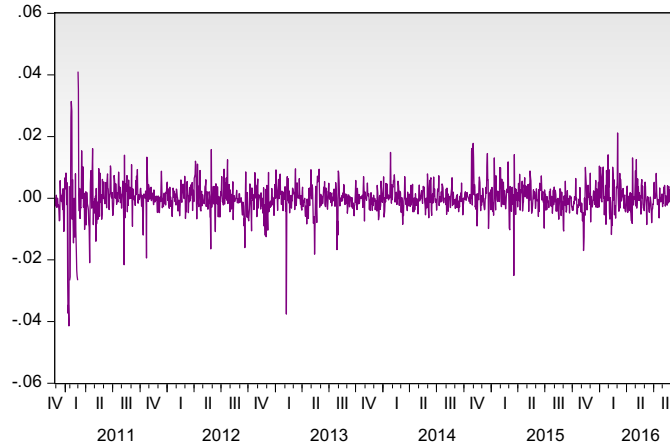
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APPENDIX
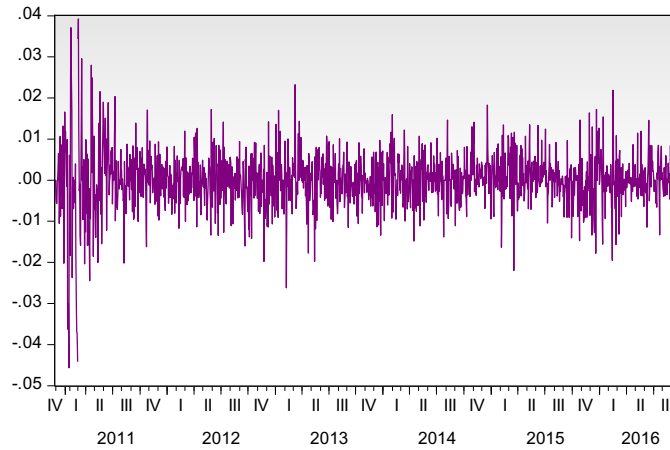
Sectoral Indices Returns

TUNINDEX

Financial companies

Financial services

352

Consumer services

Distribution

Banks

Consumer goods

Construction and building care items

Automobiles and car parts