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IMPACT OF COVID-19 ON THE MOROCCAN STOCK MARKET: APPLICATION OF THE GARCH/EGARCH APPROACH

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Abstract

Using daily data, this paper applies generalized autoregressive conditional heteroskedasticity (GARCH) and exponential garch (EGARCH) approach to examine the effect of the current Covid-19 pandemic crisis on the Moroccan stock market from 01/01/2019 to 31/12/2020. More specifically, we have conducted a comparative study analyzing the volatility and leverage effect of stock market returns of the Moroccan All Shares Index (MASI), an index representative of the Moroccan stock market, before and during the period of Covid-19. The data used in this study are daily values of the evolution of the MASI index. Our selected empirical results indicate that there is a negative effect of the covid-19 pandemic on the Moroccan stock market.

Keywords: *Covid-19; EGARCH; GARCH; Leverage effect; Volatility.*

1. Introduction

"Since the 13th century, the world observed economic slowdown and many death tolls due to the impact of many epidemics and pandemics like the Spanish flu, SARS, MERS, Swine flu, Zika, Ebola, cholera plague, dengue and so on" (Bhunia and Ganguly 2020).

On February 20, 2020, the World Health Organization (WHO) declared the Covid-19 as a global health emergency, subsequently as a pandemic on March 11, 2020. The outbreak of Covid-19 (SARS-Cov-2) named COVID 19 first appeared in the Wuhan region of China in December 2019 and subsequently became a global pandemic with rapid expansion.

To this end, the World Health Organization (WHO) has posted a warning signal for all countries to go into containment phase. The latter offers the advantage of stopping the spread of this new disease with the support of social distancing. On the other hand, this sanitary crisis has disrupted the economic activities of the country and has maintained effects on the environment of investors.

In this respect, the present research illustrates the effect of COVID-19 on the Moroccan stock market by applying the econometric approach of the GARCH and EGARCH family. Specifically, we attempt to compare the volatility and leverage effect before and during the COVID-19 pandemic of the stock returns of the MASI (Moroccan All Shares Index). In this context, we put this study in a problematic that essentially questions the effect of the COVID-19 pandemic shock on the daily stock market returns in Morocco.

In addition, there are many reasons to study the effect of Covid-19 on the Casablanca stock exchange including the volatility of the Moroccan stock market. First, the rapid spread of this pandemic globally and the need for all countries to move into containment. Second, the Covid-19 epidemic has affected global markets, economies, businesses and employees, as well as human health. For these reasons, the impact of the global Covid-19 epidemic on world stock markets has been investigated at a global level.

During the period of Covid-19, the stock market index of the most affected countries was drastically reduced, and some stock markets have had big declines, while some stock markets increased. The stock markets in which the value decreases are "Belguim, Netherlands, Sweden, United States, Germany, Portugal and Switzerland". Compared to the stock markets which the value increases, on find "Taiwan, Hong Kong, Singapore, Israel, China, South Korea" (Wang and al, 2020). So, the impact of the Covid-19 pandemic in terms of bad news has a bigger influence on international stock markets.

This article aims to analyze the impact of Covid-19 on the daily stock market returns of MASI in Morocco and it is essentially articulated around three main axes:
The first axis offers a review analysis of existing literature related to the effect of Covid-19. The second axis have devoted to the methodology of our work by explaining the main research designs and their characteristics. The last axis examines the empirical results with a comparison of volatility and leverage by examining the impact of the Covid-19 pandemic on the stock market and then a conclusion of the whole discussion.

2. Literature Review

This section presents the empirical results from the existing literature regarding the relationship between the Moroccan stock market and the current Covid-19 pandemic. A number of research studies have examined the effect of the Covid-19 pandemic on stock market returns. The empirical results from the existing literature can be grouped as follows:
Most recently, Ali, Alam, and Rizvi (2020) analyze the effect of Covid-19 on financial markets globally using Exponential GARCH (EGARCH) models. They divide the sample of their study into two parts, the first part concerns the epidemic (from December 2019 to March 10, 2020) and the second part concerns the pandemic (-post- March 10, 2020), with a global spread of Covid-19 divided into three phases. The first phase: from January 1, 2020, to February 14, 2020 which corresponds essentially to the spread of deaths in China. The

second phase starting from February 15, 2020 and ending on February 28, 2020 represents the beginning of deaths in Europe and the last phase corresponds to the spread of deaths in the United States. The empirical results show that China has recorded stability and low volatility during both phases (epidemic and pandemic) while global markets have recorded a drop with the transition from the epidemic phase to the pandemic phase. However, European markets recorded more negative returns compared to other world markets due to the cessation of all economic activities which directly influences the market.

Similarly, the study by Al-Awadhi and al. (2020) on the effect of Covid-19 virus on the Chinese stock market, the authors analyze the direct relationship between infected Covid-19 cases and Chinese stock market returns by applying econometric analysis of panel data with two measures: the daily growth in the total number of confirmed cases and the daily growth in the total number of deaths caused by Covid-19. The data used in the study begins on January 10, 2020 and ends on March 16, 2020. In addition, the authors analyze the stock returns of all companies included in the Hang Seng Index and the Shanghai Stock Exchange Composite Index during the Covid-19 outbreak. They note that the daily growth in the total number of confirmed cases as well as the total number of deaths caused by the Covid-19 have a negative impact on stock market returns in China. They conclude that Covid-19 has a negative effect on the Chinese stock market.

Dinghai (2021) analyze the impact of the COVID-19 pandemic on the stock market in terms of risk using the Realized Exponential GARCH (REGARCH) model. The authors adopt a time-varying coefficient volatility model to investigate the potential COVID-19 impact on the Canadian stock market using the S&P/TSX Composite Index data (up to May 2020). Empirical results indicate that “the global pandemic of the COVID-19 drove the tremendous surge in expected market volatility level of the Canadian S&P/TSX Composite Index around

January 25th, 2020 when the very first "presumptive" case of the covid-19 was detected in Canada". In addition, the results of this study show that during the COVID-19 period, the negative news could be more negative, and similarly the positive news could be more positive.

Using Wavelet-based multi-timescales analysis on the daily data from 21st January to 27th November 2020, Md. Bokhtiar and al (2021) explore empirically the effect of the COVID-19 pandemic on Islamic and conventional stock markets. The results indicate that the pandemic creates identical volatility in both stock markets. In addition, the authors suggest that both markets are strongly associated and tend to co-move highly during the period of Covid-19.

As part of the study of Chaouachi and Chaouachi (2020) on the effect of the Covid-19 pandemic on the KSA stock market using an autoregressive distributed lag (ARDL) cointegration approach to examine the relationship between Covid-19 infection cases and the trading volume of the main KSA Tadawul All Share (TASI) market index in the short and long term on daily data from March 2, 2020 to May 20, 2020. Empirical results indicate that the Covid-19 pandemic has a negative effect on the KSA stock market in the long term, i.e. a significant negative link between LOG-TASI and LOG-COVID-19. In addition, a Toda-Yamamoto causality test was applied to confirm a causal relationship between the study variables, specifically, a unidirectional causality from LOG-COVID-19 to LOG-TASI confirmed by a robustness analysis.

Using Generalized Autoregressive Conditional Heteroscedasticity Autoregressive Conditionality (GARCH, GJR GARCH), Jelilov and al. (2020) examine the impact of the Covid-19 pandemic on the relationship between stock market returns and inflation in Nigeria on daily data covering the period February 27, 2020 to April 30, 2020 with the objective of determining whether stock market returns cover against inflation taking into account the

effect of the Covid-19 pandemic. The empirical results of this study indicate that the inflation rate and confirmed cases of Covid-19 increase the volatility of the Nigerian stock market. In addition, the GJR GARCH models report the negative effect of Covid-19 on stock market returns to the extent that stock market returns react negatively to the Covid-19 shock.

In a study based on daily data, Bhunia and Ganguly (2020) used the GARCH model, the EGARCH model and the TGARCH model to analyze the volatility and leverage of the affected stock markets "United States (NYSE S&P 500), Spain (IBEX 35), France (CAC 40), United Kingdom (FTSE 100), Italy (FTSE MIB), Germany (DAX 30), Russia (IMOEX) and India (Nifty 50)" before and during the current Covid-19 pandemic. The pre-pandemic study period for Covid-19 runs from September 1, 2019 to December 31, 2019 while the period during the COVID-19 pandemic runs from January 1, 2020 to April 30, 2020. The results obtained from the GARCH model highlight the existence of volatility during the two selected periods and that the Spanish stock market is more volatile before the pandemic as well as the selected stock markets are more volatile during the Covid-19 pandemic. Regarding the results of the EGARCH and TGARCH models, they also indicate the existence of leverage during both periods. In addition, the authors conclude that the Covid-19 effect in terms of bad news influences the stock markets.

Similarly, Zeren and Hizarci (2020) used the Maki Cointegration Test (2012) to examine the effect of the COVID-19 Coronavirus pandemic on daily stock market data in China (SSE), South Korea (KOSPI), Italy (FSTE MIB), France (CAC 40), Germany (DAX 30) and Spain (IBEX 35) during the period January 23, 2020 through March 13, 2020. Specifically, the authors analyze the relationship between Zeren and Hizarci (2020) the daily number of confirmed Covid-19 cases as well as the daily number of deaths caused by Covid-19 and the stock markets of the selected countries in the long run. The empirical results highlight the

existence of a cointegrating relationship between total daily mortality and the set of selected stock markets in the long run. On the other hand, daily confirmed COVID-19 cases have a cointegrating relationship only with SSE, KOSPI and IBEX 35. Thus, the presence of deaths caused by COVID-19 influences the choices of all stock market investors. Therefore, the authors conclude that investing in the stock market is not the right choice for investors. They find that investing in the gold market is an optimal choice in the current situation. The latter offers the possibility of moving to derivative markets and crypto-currencies which can be optimal choices of investing.

Şenol and Zeren (2020) investigate in a study on the impact of COVID-19 on stock markets globally represented by MSCI World, MSCI European, MSCI Emerging, MSCI G7 indices the relationship between these stock indices and COVID-19 using cointegration test. The authors find that stock markets react quickly to COVID-19 risks and that all these indices have long-term relationships with the Covid-19. It is important to add the impact of Covid-19 is not yet over. Generally, the research works of Nippani and Washer (2004), Loh (2006), C. D. Chen and al. (2009), Qiu and al. (2018) and M.-P. Chen and al. (2018) find that epidemic diseases lead to negative effects on stock markets. Şenol and Zeren (2020)

In summary, these studies conducted in the existing literature on the impact of the COVID-19 pandemic on the stock markets remain quite limited and particularly on the Arab stock markets. So:

- This study is the first research examining the relationship between the daily returns of the MASI index of the Moroccan stock market, and the Covid-19 using GARCH and EGARCH models.
- This study analyzes the effect of the current pandemic COVID-19 on the Moroccan stock market during the period from January 1, 2019 to December 31, 2020.

3. Methodology

The objective of our study is to examine the effect of the COVID-19 pandemic on the Moroccan stock market through a comparative study analyzing volatility and leverage effect. For this purpose, the econometric approach adopted in this comparative study is based on autoregressive models with conditional heteroscedasticity.

3.1. Research model

Our econometric approach seeks to analyze the effect of COVID 19 on the Moroccan stock market. To this end, we have conducted a comparative study analyzing the volatility of the Moroccan stock market and the leverage effect using the GARCH approach developed by (Bollerslev 1986) to analyze the impact of the health crisis of COVID 19 and the EGARCH models introduced by (Nelson 1991) to measure the leverage effect.

The GARCH (Generalized Autoregressive Conditional Heteroskedasticity) models introduced by Bollerslev (1986) are generalized ARCH models of Engle (1982) in which lagged values of the conditional variance are added and the evolution of the instantaneous volatility is explained by past volatilities. Indeed, their characteristics are mainly based on the phenomenon of heteroscedasticity observed in financial series.
In a GARCH (p, q) process, the conditional variance is modeled as follows:

$$\sigma^{2}_{t} = \alpha_0 + \sum_{i=1}^{q} \alpha_i \, \varepsilon^{2}_{t-i} + \sum_{j=1}^{p} \beta_j \, \sigma^{2}_{t-j} \quad \text{Eq. (1)}$$

In order to ensure the positivity of σ^{2}_{t}, it is necessary that all the parameters $\alpha_0 > 0$, $\alpha_i \geq 0$ and i = 1 ...q and $\beta_j \geq 0$, j = 1... p are not negatives.

In this formula, p represents the first-order term of the autoregressive form of the conditional variance according to the model GARCH σ^2 and q expresses the first-order term of the process terms ARCH ε^2.

The exponential GARCH model known as EGARCH (Exponential GARCH) was developed by Nelson (1991). It is an extension of the classical GARCH model. This class of model offers the advantage of capturing the effect of asymmetry on the conditional variance as a function of the signs of the shocks of the residuals from the previous period. In other words, the specification of this model is to take into account the effect of innovations on the conditional variance. Moreover, it is an asymmetric model based on the assumption of asymmetry and it relies mainly on the phenomenon of asymmetry or leverage effect.
An EGARCH model is expressed as follows:

$$\ln \sigma_t^2 = \alpha_0 + \sum_{i=1}^{q} \alpha_i(\emptyset z_{t-i} + \gamma[|z_{t-i}| - E|z_{t-i}|] + \sum_{j=1}^{p} \beta_j \ln \sigma_{t-j}^2 \qquad \text{Eq. (2)}$$

Such as :

α represents the effect of a shock

β expresses the term autoregressive

γ represents asymmetry effect

In this EGARCH process, the parameters α_0 , α_i , β, γ and $\emptyset$ are real, the necessity of the positivity of the different parameters of the equation does not expose to obtain a positive conditional variance, contrary to the standard GARCH model because this conditional variance is represented in the form of a linear logarithm. However, this conditional variance is a function of the sign effect of shocks corresponding to $\alpha_i z_{t-i}$, when the shock has a negative sign, the conditional variance tends to increase, and when it does not, it tends to decrease.

In addition, the Exponential model GARCH makes the conditional variance of period t depend on that of period t-1, that is, on the standardized shocks in t-1 and on the difference between the absolute value of the standardized shocks and their expectation in t-1. Rzepkowski (2001).

Moreover, the asymmetric EGARCH model offers an advantage over the classical GARCH model. The latter depends only on the severity of the effect, not the positive or negative sign of the innovation. The amplitude effect is measured par $\beta_j \quad [|z_{t-i}| - E|z_{t-i}|]$, i.e. the difference between the absolute value of the standardized shocks and its expectation of the previous period. This EGARCH model is stationary if it satisfies the condition $|\beta| < 1$. Moreover, the value $E\,[|z_{t-i}|]$ depends on the previously determined law of z_t .

3.2. Data

To examine the impact of the COVID-19 pandemic on the Moroccan stock market, we conduct this study over two periods: before and during the COVID-19 period. Indeed, our sample is selected on the basis of the appearance of the first confirmed case of COVID-19 in China. So, the first period before COVID-19 was identified from January 1, 2019 to 12/31/2019. The period of COVID-19 is from January 1, 2020 to 12/31/2020. Our selected data including daily closing data of the Moroccan All Shares Index (MASI) are collected from the website www.investing.com. From these data, we build the daily MASI return series of our empirical study using a natural logarithm transformation.

4. Results and discussions

The purpose of this section is to discuss the empirical findings and discussions of this study. Sub-section 4.1 devoted to descriptive statistics. Sub-section 4.2 discussed the results of the

GARCH and EGARCH models. Finally, we completed this section with a discussion of the results.

4.1. Descriptive statistics

Table 1 presents descriptive statistics on the daily returns of the Moroccan All Shares Index (MASI) index of the Moroccan stock market before and during the period of COVID-19.

Table 1: Statistical properties

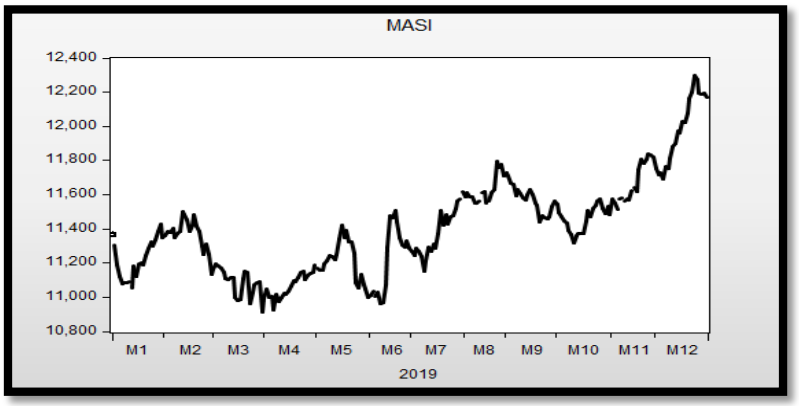
Statistical Properties	Before of Covid-19	During the Covid-19
Mean	0.000279	-0.000302
Max	0.019549	0.053054
Min	-0.016421	-0.092317
Std Dev	0.004906	0.012915
Skewness	0.092624	-2.089666
Kurtosis	4.799588	18.54818
J.B	33.54656	2700.133
Prob	0.000000	0.000000

Source: Authors' Computation using Eviews 10

First, we find that the kurtosis coefficient (Flattening Indicator) is well above 3 during the two selected periods. This indicates that our series is Leptokurtic i.e. less flat than normal. Secondly, the skewness coefficient (Asymmetry Indicator) is different from zero for both periods. Before the period of COVID-19, the value of Skewness is 0.09, this indicates that the distribution is approximately symmetrical. Compared to the COVID-19 period, the Skewness value is -2.089, indicating that the series is highly skewed. In addition, we note that the Moroccan stock market became more volatile with a standard deviation of 0.0129 over the period of COVID-19. According to Jacque-Berra's test, the distributions of index returns do not follow a normal distribution before and during the COVID-19 period.

Figure 1 shows the evolution of the MASI index before the COVID-19 period, from January 1, 2019 to December 31, 2019.

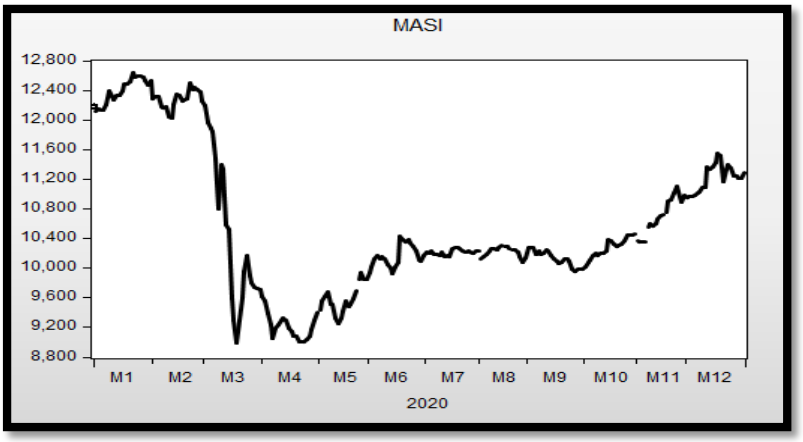
Figure 1: Evolution of MASI before the period of COVID-19 (January 1, 2019 to December 31, 2019)



Source: Authors' Computation using Eviews 10

Figure 2 shows the evolution of the MASI index during the period of COVID-19, from January 1, 2020 to December 31, 2020.

Figure 2: Evolution of MASI during the period of COVID 19 (January 1, 2020 to December 31, 2020).



Source: Authors' Computation using Eviews 10

4.2. Quantitative results and discussion

Before beginning the comparative approach analyzing stock market volatility and leverage effect, the first step is to study the stationarity of the series in question.

To study the stationarity of time series, we apply the test used in stationarity studies, that of Dickey and Fuller (1979).

Table 2 : Augmented Dickey-Fuller test results of the logarithmetic daily returns of the MASI index before and during the Covid-19

Var	Test ADFin level			Test ADF in test first differences			Results
	T- Statistic	V- 5 %	P- Value	T- Statistic	V- 5 %	P- Value	
Masi before the Covid-19	0.916723	-1.942120	0.9040	-14.61811	-1.942126	0.0000	**I(1)**
Masi during the Covid-19	-0.466672	-1.942104	0.5125	-13.39817	-1.942104	0.0000	**I(1)**

Source: Authors' Computation using Eviews 10

The table 2 provides the results of the stationarity test of (Dickey and Fuller 1979) at the level and first difference before and during the period of COVID 19. From this table, it can be seen that the probability is greater than 5% in both periods. This makes it possible to accept the null hypothesis of non-stationarity. The series become stationary only at the first differentiation. Then, we say that they are all integrated of the same order, i.e. I(1). We will therefore continue our analysis with the ARCH effect test. This test allows us to test the presence or absence of heteroskedasticity in our series of MASI stock returns before and during the COVID-19.

Table 3: **ARCH test result before the COVID-19 period**

Dependent variable	TR^2 statistic	F statistic	$Resid^2(-1)$
MASI returns	**0.0018**	**0.0018**	**0.1979**

Source: Authors' Computation using Eviews 10

The results of this test indicate that the probabilities associated with the TR^2 statistic and the F statistic are less than 5%, we then accept the hypothesis of the presence of an ARCH effect of order (1) and the coefficient attached to the residue (-1) is statistically significant at the 5% threshold,which also confirms the presence of heteroskedasticity. Thus, our series follows an ARCH process of order (1) before the period of COVID-19.

Table 4: ARCH test result during the COVID-19 period

Dependent variable	TR^2 statistic	F statistic	$Resid^2(-1)$
MASI returns	**0.0224**	**0.0224**	**0.1449**

Source: Authors' Computation using Eviews 10

The results of this test indicate that the probabilities associated with the TR^2 statistic and the F statistic are less than 5%, we then accept the hypothesis of the presence of an ARCH effect of order (1) and the coefficient attached to the residue (-1) is statistically significant at the 5% threshold, which also confirms the presence of heteroskedasticity. Thus, our series follows an ARCH process of order (1) during the period of COVID-19. The results obtained in table 3 and 4 confirm the presence of heteroskedasticity in both periods.

4.2.1. Results of GARCH model

Table 5 provides GARCH (1, 1) model results of the daily returns of the MASI index before and during the COVID-19 period. It shows that before and during the period of COVID-19,

all coefficients associated with the ARCH (α) effect and the GARCH (β) effect are positive and statistically significant. In particular, the positive and significant value of α essentially reflects that the new information have an impact on the volatility of the Moroccan stock market.On the other hand, the positive and significant value of β means that old information also has an impact on volatility.

Table 5 : ARCH and GARCH order (1,1) test result Before and during the period of Covid-19

	Before Covid-19		**During Covid-19**	
	Coef	**Prob**	**Coef**	**Prob**
ω **(Constant)**	5.71E-06	0.042	1.34E-05	0.000
α (ARCH Effet)	0.115	0.050	0.277	0.000
β (GARCH Effet)	0.640	0.000	0.596	0.000
α + β	0.755		0.873	

Source: Authors' Computation using Eviews 10

In addition, the results of the GARCH test (1.1) also indicate that the Moroccan stock market is more volatile during the COVID-19 pandemic. That means that the volatility of stock market returns can be reflected in earlier volatility that tends to persist over time. Specifically, the persistence of volatility shocks, as represented by the sum of the ARCH and GARCH parameters in the GARCH model (1,1), is important before and during the COVID-19 pandemic to the extent that the effect of a shock today remains in the variance forecasts for many periods in the future.

4.2.2. Results of EGARCH models

The results in Table 6 indicate that the sum of α and β (ARCH and GARCH effect) in the EGARCH model (1.1) is less than one before the COVID 10 period, which reflects the absence of the ARCH and GARCH shocks on the volatility of MASI stock returns. Furthermore, we find that during the COVID-19 period, the sum of α and β (ARCH and GARCH effect) in the EGARCH model (1.1) is greater than one, which indicates the existence of the ARCH and GARCH shocks on volatility.

Table 6 : EGARCH order (1,1) test result Before and during the period of Covid-19

	Before Covid-19		**During Covid-19**	
	Coef	**Prob**	**Coef**	**Prob**
ω (Constant)	-4.308	0.103	-1.167	0.000
α (ARCH Effet)	0.188	0.072	0.375	0.000
β (GARCH Effet)	0.610	0.013	0.904	0.000
α + β	0.798	---	1.279	---
λ (Leverage Effect)	0.089	0.147	-0.104	0.030

Source: Authors' Computation using Eviews 10

The λ parameter (Asymmetric coefficient) is negative (-0.104) during the period of the COVID-19 pandemic and statistically significant at the 1% threshold. This indicates the existence of leverage on the Moroccan stock market during the COVID-19.

In terms of exponential**,** $\lambda = e^{-0.104} = 0.901$, which indicates that for MASI, the bad news of the COVID-19 pandemic has a significant effect on the volatility of the Moroccan stock market. Similarly, Bhunia and Ganguly (2020) examine the leverage effect before and during the period of Covid-19 in international stock markets (France, Germany, India, Italy, Russia, Spain, UK and USA. They point out that leverage effect exists in France stock market only before the period of Covid-19. Moreover, this indicates that a positive impact on the France

stock market produces lower volatility than a negative impact. During the period of Covid-19 leverage effect exists in UK stock market only. “Likewise, this indicates that a positive impact to the UK stock market produces lower volatility than a negative impact”.

5. Conclusion

The World Health Organization has declared the Covid-19 epidemic as a global pandemic. All international stock markets have been affected by the effects of this health crisis of COVID-19. This empirical study focuses on determining the impact of the current Covid-19 pandemic crisis on the Moroccan stock market from 01/01/2019 to 31/12/2020. To examine this impact, we applied the GARCH and EGARCH models before and during the COVID-19 pandemic. More specifically, this study aims to compare the volatility and leverage effect of the Moroccan stock market.

As highlighted in the existing literature, this pandemic crisis has a negative impact on international stock markets. The results of descriptive statistics confirm that the Moroccan stock market became more volatile during the period of COVID-19. In addition, our GARCH model results indicate that there is a stronger ARCH and GARCH shock in 2020 than in 2019. The results of the EGARCH models in our study also show the existence of leverage during the Covid-19. Therefore, the COVID-19 health crisis also has a negative impact on the stock returns of the MASI index in Morocco. Finally, this study is conducted during the current pandemic crisis. Therefore, the impact of COVID-19 is not yet complete.

As has been pointed out in the existing literature, pandemic and epidemic diseases cause negative effects on stock markets. Şenol and Zeren (2020) found a long-term relationship between stock markets and the Covid-19 as the effect of this disease is not yet over. Jelilov and al. (2020), Chaouachi and Chaouachi (2020), Al-Awadhi and al. (2020), and Ali and al (2020) found that stock markets react quickly to the risks of COVID-19. Our results obtained

in this study are consistent with the recent study conducted by Bhunia and Ganguly (2020) which highlight that stock markets are more volatile during the COVID-19 pandemic.

This study focuses only on the principal index of Moroccan stock market. Therefore, it would be better to also examine the sector indexes in order to accurately analyze the effect of the pandemic disease on each sector. In addition, it would be better also to do a benchmarking between the Moroccan stock market and other international stock markets like China.

In the event that the pandemic continues and its effects are not yet over, we suggest for future studies to examine to extensively search how the effects of the pandemic crisis will be after that and taking into account other variables in order to have more accurate economic results to be carried out after pandemic for policy makers and also investors.

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