Stock Market Reaction at the WHO's Announcement of a Pandemic due to COVID-19 of the French Pharmaceuticals

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Abstract:

Purpose: The year 2020 was hit by a unique economic crisis due to disease, Covid-19. It was first identified in December 2019 in China. The WHO, on March 11th, 2020, declared the Covid-19 a pandemic. This research paper aims to investigate the market reaction of the pharmaceutical companies in France on the day that WHO announced the Covid-19 disease to be a pandemic.

Design/Methodology/Approach: We apply the classical event study methodology for our purpose. We selected this sector because we considered that a health crisis such big as the coronavirus pandemic would, of course, affect all the industries in various degrees. Still, it will strongly influence the pharmaceutical sector that also has the opportunity/chance of finding a cure (medicines and vaccines) to this disease and stop the crisis. It seems to be the only industry that can fight back such a crisis by finding a cure.

Findings: The results show a strong adverse reaction upon this announcement in pharmaceutical companies in contrast to our hypothesis. The French investors perceived this announcement as a negative signal that will affect almost every economic sector, including the pharmaceutical companies. However, since March 18th, 2020, the second day of the government imposed total lockdown, the market reaction turned positive and significant.

Practical Implications: The results of this research may be useful for Government decision makers, investors and pharmaceutical companies in order to optimize their strategies and improve their responses to the ongoing pandemic crisis.

Originality/Value: The results of this study will be helpful not only to the academicians by enriching the pertinent literature and the politicians and the practitioners. They can benefit from focusing on this sector and determine the appropriate policies and measures for its growth in finding the means to fight this health crisis.

Keywords: Financial crises, event study, covid-19, health-care markets.

JEL classification: G01, G14, I11.

Paper Type: Research study.

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1. Introduction

Globally, the year 2020, from the first quarter of it, was a year of a unique economic crisis due to a pandemic disease called Covid-19. This is a deadly flu coronavirus with the actual name (SARS-CoV-2), very contagious. It first hit China, where it was identified, specifically in Wuhan, Hubei Province, in December 2019, according to (Yang *et al.,* 2020). The World Health Organization (WHO) was informed on Dec 31, 2019, it announced the official designation of this deadly virus on Feb 11, 2020, and on Mar 11, it declared the Covid-19 a pandemic. After one year that has passed, we can still not contain the virus, and most of the countries on earth have suffered tremendous economic losses due to the lockdowns they have forced on their people and the various businesses. The borders are closing and opening from time to time according to the virus spread.

Therefore, trade, travel, tourism, and all the companies except the food and beverages sectors have almost collapsed in some countries or have been severely hit in some others, depending on the severity of the antivirus measures each country adopts (Grima *et al.,* 2020; Khan *et al.,* 2020). The stock markets dropped, the crude oil prices dropped, and businesses went bankrupt because they could not afford to stay in business and were closed, despite the governments' help in the form of small pecuniary aid (Ozili and Arun, 2020; Chevallier, 2020). These conditions have led the global economy to experience the worst recession since the Great Depression and face the need for a new restart to overcome the problems that appeared.

There were no efficient medicines to heal the patients from the coronavirus Covid-19 in the first months, and many pharmaceutical companies focused their research on the development of vaccines. On Mar 19, 2020, the global pharmaceutical industry committed itself to address the COVID-19, and a race started among the pharmaceutical companies in cooperation with biotechnology companies to produce an appropriate vaccine. By April 2021, 14 vaccines have been authorized for public use from various countries.

In France, the government started detecting Covid-19 cases early, and on Jan 24, 2020, they identified the first covid-19 case in Bordeaux. The French government announced and enforced a total lockdown on Mar 16, 2020, for 55 days, since the covid-19 daily cases were increasing and the daily death cases as well, whereby on Mar 5, 2020, they had three deaths from the virus and by Mar 15 they had 36 deaths. Parallelly, the French stock market was dropping fast, whereby the CAC from 6024.26 points on Jan 24 and 6069.35 points on Feb 14 dropped to 4610.25 points on Mar 11 (the pandemic announcement by the WHO) and reached the lowest point on Mar 18 at 3754.84 points, after the lockdown announcement on Mar 16. The French main stock market index lost 2314.51 points or almost 38% in one month.

This lockdown, however, did not reduce the death cases, which escalated, but resulted in all retail and wholesale stores, restaurants, cafes, bars, catering, hotels, and accommodation in general and all tourism businesses, kindergartens, schools, and universities being closed. Only the pharmacies and the pharmaceutical companies, and food suppliers were open and operating. Their employees, as well as the civil servants, were working and earning money. Teleworking was an option in previous years according to the preferences of the workers/employees became necessary to ensure the continuity of the business or the organization and was established to all the sectors of the public and private organizations that we're able to operate in this way. Therefore, all economic life was affected negatively, but despite the general conditions, some industries prospered due to their business's specificity.

It is interesting to investigate the reaction of the pharmaceutical and health care industry since it is that sector that holds the solution and the keys to the exit of this health crisis. The health care services and facilities, and products were in the highest demand. We selected the market of France since it was the second worst-hit European country after Spain (Statista Research Department, Oct 9, 2020), but larger and stronger economy from the latter affecting all of Europe economically and because it experienced one of the strictest lockdowns globally (Malliet *et al.,* 2020). In fact, according to (Malliet *et al.,* 2020), Spain, France, and Italy were the most hit countries from the developed ones, had the most severe lockdowns, and compared to April 2019 in April 2020, they suffered a loss in their monthly GDP of 35%, 30%, and 29% respectively. France is the second power in the EU member countries after Germany, so it is significant to investigate the effect of the pandemic on its pharmaceutical industry because, as a leading economy, it might have contagious effects on the other EU members. Khattak *et al.* (2021) found that Germany and France were the predictors that influenced most of the European market due to the Covid-19 crisis.

The Covid-19 pandemic is still going on and does not give any sign of being contained since there is a spread of mutations of the original virus worldwide. However, this study explores the initial impact of the Covid-19 pandemic announcement that caused fear and uncertainty in public and affected all the industries in various degrees. We selected the pharmaceutical industry because of its significance for the EU economy. Based on Eurostat 2020, the pharmaceutical industry is a vital industry of the EU market, and it provided about €213 billion in market value in 2019 and more than 7 million jobs in 2018.

This study aims to investigate the market reaction of the pharmaceutical companies in France on the day that WHO announced the Covid-19 disease to be a pandemic, on Mar 11, 2020. We apply the classical event study methodology of (Brown and Warner, 1985) for our purpose. The reason for selecting this sector is that we considered that a health crisis such big as the coronavirus pandemic would affect all the industries in various degrees. Still, it will strongly influence the pharmaceutical sector that also has the opportunity/chance of finding a cure (medicines and vaccines) to this disease and stop the crisis. It seems to be the only industry that can fight back

such a crisis. Our results will be helpful to academicians in this field, enriching the pertinent literature, to investors in making good decisions in their portfolio selection under the uncertainty of a health crisis, and to policymakers in balancing the measures to fight for the Covid-19 restriction and the protection of the businesses and the economy.

The rest of the study is organized as follows: the next section presents the relevant review of the literature. The third section contains the data, the methodology, and the testable hypotheses. The fourth section depicts and analyses our empirical results, and the final section includes a summary and offers future research ideas.

2. Literature Review

There have been enough articles that analyze the impact of the Covid-19 on different markets and industries from various viewpoints. We have selected the most appropriate ones and closest to our objective.

In the past years, some studies were examining the effect of pandemic diseases on stock market returns. The 1998 Hong Kong avian influenza (Goh and Law, 2002) found a significant adverse impact on tourism. Later, the effect of SARS on the hotel industry for Taiwan was to decrease the stock prices of the hotel industry, found by (Chen *et al.,* 2007). Also, Mctier *et al.* (2011) found that the effect of flu was negative on stock market returns for the US market because, as the flu rate increased, the trading activities were reduced. Consequently, the stock returns were reduced.

In their study Gupta *et al.* (2020b) examined and compared previous health crises in the US that occurred in the years 1918-1919, 1957-1958, and 1968 and the Covid-19 pandemic and concluded that this adverse solid stock market reaction to COVID-19 cannot be explained just because this virus is lethal, since all the previous health crises were also deadly. The reasons they proposed were the government restrictions on social distancing and commercial activities, the severe lockdowns, the business closures, and the travel prohibitions, which caused severe economic damages and changes in human behavior in almost all aspects of everyday life. Furthermore, Baker *et al.* (2020) compared the effects that previous diseases caused by viruses such as Bird Flu, SARS, Swine Flu (H1N1), Ebola, and MERS, on the one hand, and Covid-19 on the other had on the stock market behavior and concluded that none of the previous infectious diseases led to such variability of the daily stock-market prices that Covid-19 had.

Another study by Ozili and Arun, (2020) investigated the possible reasons how a health crisis like the Covid-19 pandemic has affected the global economy so negatively and found that the restriction on internal movements and higher fiscal policy spending had a positive impact on the level of economic activities, while the severe lockdowns and the travel restrictions globally reduced the economic activities,

increased uncertainty and fear, which then affected investors' investment decisions and the financial markets negatively.

On the other hand, Alam, Alam, and Chavali (2020), focused on India and studied whether the market reaction was the same in the pre-and post- lockdown period caused by the Covid-19. They used event study methodology on a sample of 31 companies listed on the Bombay Stock Exchange (BSE) randomly selected. The sample period chosen for the study was 35 days from February 24 to April 17, 2020, whereby 20 days were before the event and 15 days were during the event. The event (day1) was the official announcement of the lockdown, March 24. The first case of Covid-19 in India was reported on January 30. So, there was a gap of 53 days that the virus was spreading, there were many deaths, and there was no action by the government, which caused a lot of concern. This was reflected in the negative AARs (Average Abnormal Returns) in the pre-lockdown period, whereby the authors assumed that investors panicked because of the virus effects. On the other hand, the market reacted positively with significantly positive AARs in the after-lockdown period. Investors anticipated the lockdown and responded positively to it, hoping to stop the severity of the disease's spreading and the stock market would benefit.

In their study Ramelli and Wagner (2020), examined the impact of COVID-19 on a company's international trade and financial policies and found an adverse market reaction of the internationally oriented US firms, especially those that traded with China. The markets had a strong negative response when the virus spread across Europe and the US. So, this study showed how a health crisis caused a significant, contagious economic turmoil.

Various researchers have studied multiple predictions related to Covid-19. Fanelli and Piazza, (2020) forecasted the spread of COVID-19 in China, Italy, and France using the SIRD model. Roosa *et al.* (2020) did real-time forecasts in China with a generalized logistic growth model (GLM) for COVID-19. Benvenuto *et al.* (2020) forecasted the spread of COVID-19 using ARIMA, and finally Koczkodaj *et al.* (2020) predicted the COVID-19 cases outside of China using a simple heuristic (exponential curve).

Another study examined the effect of the COVID-19 pandemic on the Chinese stock market (Apergis and Apergis, 2020). They used the GARCHX model for the period January 27 to April 30, 2020 period. They found that daily increases in total confirmed COVID-19 cases, measured as total daily deaths and circumstances, had a significant adverse effect on the stock returns. When the death cases were used compared to the disease-only instances, the negative impact of the COVID-19 on the stock returns was more substantial.

The results also showed that the daily increases of the COVID-19 cases and deaths had a positive and statistically significant effect on the volatility of these stock returns since it was and still is a very fearsome event. So, the higher the risk and investors'

fear, the higher the volatility. The authors also considered the short-term interest rates and the oil prices, which negatively related to the speed of return. The negative sentiments of fear and uncertainty that the coronavirus pandemic caused to humans influenced their behavior in all aspects of their lives, among which are also their investment decision making that led to adverse effects on the stock market prices (Gurav *et al.,* 2020).

In his study Lee (2020) investigated the initial impact of COVID-19 sentiment on the US stock market by industry, examining 11 sectors from January 21, 2020, to May 20, 2020. He found that initially, all industries were affected negatively, but the degree of COVID-19 sentiments varied by industrial sectors. The COVID-19 feeling was measured by the Daily News Sentiment Index (DNSI) and the terms "laid off," "unemployment," "recession," and "vaccine" were used.

The sectors that fell dramatically were leisure and hospitality. The communication services, consumer discretionary, industrial, energy, and material industries correlated highly to the pandemic. In contrast, the real estate and consumer staples had a middle-level correlation, and the utility sector had a middle-or low-level correlation. The industries of information technology and health care were classified in all three groups of correlations.

The other side of the globe Huo *et al.* (2020) examined the stock market reaction of China to the coronavirus pandemic in 2020, specifically to the pandemic lockdown announcement. They found that the industries of Leisure Service, Commerce, Agriculture, Mining, Light-industry Manufacturing, Architectural Ornament, Real Estate, Nonferrous Metal, Transportation, Defence & Military, Utilities, Food & Beverage, Machinery Equipment, Textile & Apparel, Ferrous Metal, Electrical Equipment, Automobile, Building Material, Banking, Non-bank finance, Telecommunication, and Chemicals had an adverse market reaction, with the first one having suffered the most severe effects to the COVID-19 outbreak.

On the other hand, the Pharmaceutical & Biotechnology, Computer, Electronics, Household Appliances, and Media industries had a positive reaction, with the first having the best positive performance since the demand for medical service was expected to be high with the pandemic going on.

Also, He *et al.* (2020) studied the market reaction of China's industries to the COVID-19 pandemic. They applied event study methodology and found that this pandemic had a severe negative impact on transportation, mining, electricity and heating, and environmental ones. At the same time, it affected the industries of public management, information technology, sports and entertainment, business services, manufacturing, education, and healthcare positively.

More recently, Just and Echaust (2021) examined how the stock market indicators of implied volatility, implied correlation, and liquidity affected the S&P500 index during the COVID-19 pandemic and caused such a tremendous decrease. They also examined the influence of COVID-19 daily cases and deaths on the stock market returns. They focused on the European countries because the coronavirus spread there fast after China. They found that daily announcements of new COVID-19 cases had no impact on the S&P500 index returns. In contrast, the report of death increases in Italy, the Netherlands, and Switzerland had a significant adverse effect on its returns. They also found that the announcement of death increases in Spain, Russia, and Belgium increased the implied correlation. Still, stock market liquidity was not affected by the daily reports of cases nor deaths due to COVID-19.

Regarding Europe Khattak *et al.* (2021) used a machine learning technique from January 1 to June 26, 2020, to investigate the influence of the European market of 21 shocks during the covid-19 pandemic crisis. They found that the European market was affected mainly by the index of Singapore, Switzerland, Spain, France, Germany, and the S&P500. There was a significant difference in the predictors before and after the pandemic announcement by WHO. After this announcement, Germany and France were the predictors that influenced most of the European market.

More specifically, Di Domenico *et al.* (2020) used a mathematical model to evaluate the COVID-19 pandemic effect in France, assessing the impact of the total lockdown on March 17, 2020, and estimate the effectiveness of possible exit strategies. The extreme measures of lockdown, social distancing, and quarantine in China helped control the spread of the virus, so they thought that the same would be for Europe and France in particular, actually, to the region of Île-de-France. The first wave of the pandemic showed that people kept low physical contact, which helped. Still, there should be an exit strategy to balance the socio-economic pressure of the severe measures and the gradual liberation so that the health system would not be overwhelmed.

Malliet *et al.* (2020) examined the economic and environmental effects of COVID-19 in France that the government lockdown measures had from March 17 to May 11, 2020. Their results indicated a robust short-term GDP decrease in 2020 of −5.1% because of the sudden decline in aggregate demand due to the lockdown. However, the authors expect this demand shock to be temporary and the economy to be recovered progressively in the following decade.

On the other hand, Ben Salem *et al.* (2020) tried to describe and analyze the effects of the pandemic on the French economy from a macroeconomic and financial perspective. They did a descriptive analysis of the volatility that increases in the macroeconomic indicators. They concluded that the domino effect that enhances the economic recession is unavoidable in the future since the end of this health crisis could not be predicted. The government of France offered massive support measures to the

businesses that suffered from the lockdowns. Still, so far, these financial measures have not been able to jump-start the economy.

3. Research Methodology

As the COVID-19 pandemic is spread all over the world, and in France, more compared to the other European countries (Statista Research Department, October 9, 2020), there was from the beginning days of the pandemic and still is, increased demand for healthcare services and pharmaceutical products at all levels due to the COVID-19 pandemic and essential related equipment and facilities.

Based on the literature review, the coronavirus's effect on the healthcare industry in France has not been examined yet, although it has been discussed in China (He *et al.,* 2020). Therefore, this study tries to cover this gap and enrich the pertinent literature regarding the early days of this new health crisis.

Our sample consists of all the pharmaceutical companies listed in the French stock market collected from the Thomson EIKON database. The initial model was 55 companies, but those that did not have the necessary data were excluded, and the final sample consisted of 45 companies in the pharmaceutical, biotechnology, and life sciences industries, the GICS code number 3520, that were listed in the Paris stock exchange during the period 1-6-2019 to 1-6-2020.

Our testable hypothesis is that there is expected to be a positive market reaction of the companies in the healthcare French industry to the announcement that COVID-19 is a pandemic by the WHO since this is the most needed and most affected from the industrial sector the first eruption of COVID-19. Therefore, this industry was not expected to be affected negatively by the announcement, following the studies of Huo *et al.* (2020) and He *et al.* (2020) regarding China's pharmaceutical industry, whereby the impact of COVID-19 was positive. On this fact, we formed our hypothesis.

We apply the event study methodology according to Brown and Warner (1985). The market model assumes a linear relationship between the returns of each security and the market portfolio returns. We use the market model for stock returns, as specified by Madura and McDaniel (1989). We try to measure how rapidly security prices respond to news announcements, here specifically, to the WHO announcement that COVID-19 is a pandemic on March 11, 2020.

From June 14, 2019, to March 26, 2020, the daily stock returns are calculated using daily stock prices data from the Thomson Refinitiv EIKON database for each company in the sample. The estimation period ranges from day t=-180 today t=-11, relative to the WHO announcement day of a COVID-19 pandemic on March 11, 2020 (day t=0), in other words, from June 14, 2019, to February 26, 2020. In the case of

stock splits, the computation of daily returns is adjusted accordingly. From June 14, 2019, to March 26, 2020, the CAC40 equity index is used as the market proxy.

The impact of the COVID-19 pandemic announcement on the stock price of the selected companies is estimated using the following market model for stock returns:

$$R_{jt} = a_j + b_j R_{mt} + e_{jt} \tag{1}$$

where:
R_{jt} = daily return of the jth company on day t.
R_{mt} = daily return of the market on day t.
a_j = intercept of the market model.
b_j = COV (R_{jt}, R_m) / VAR (R_{mt}), slope of the market model, which measures the systematic risk of the jth company.
e_{jt} = error term, assumed to be normally distributed, with zero mean $[E(e_{jt}) = 0]$ and constant variance $[COV(e_{jt-1}, e_{jt}) = 0]$.

After the market model is estimated by Ordinary Least Squares (OLS), the parameters calculated over the estimation period are used to derive the expected returns for each security over an estimation period of 21 days, from day t=-10 to day t=+10, around the event date (day t=0):

$$E(R_{jt}) = \alpha_j + \beta_j R_{mt} \tag{2}$$

The intercept estimate (αj) should be equal to zero for the market model to be well specified for each stock in the portfolio. The calculation of the slope (βj) would indicate the systematic risk of security j. If it were zero, it would suggest that market factors do not influence the returns of that stock. If it were more significant, less, or equal to one, it would imply that the specific company was more, less, or equally risky, respectively, to the market portfolio.

The difference between the actual return Rjt and the expected return E(Rjt) for each stock j from day -10 today +10 gives the abnormal returns ARjt for each firm in the sample for each day of the examination period. These are defined as:

$$AR_{jt} = R_{jt} - E(R_{jt}) \quad t=-10, \dots, +10 \tag{3}$$

or

$$AR_{jt} = R_{jt} - (\alpha_j + \beta_j R_{mt}) \tag{4}$$

The portfolio abnormal return for each day is:

$$AR_{pt} = \frac{(\sum_{j=1}^{N} AR_{jt})}{N} \quad t=-10, \dots, +10 \tag{5}$$

Where N=45

This portfolio abnormal return is tested for significance with the following t-statistic:

$$t = \frac{AR_{pt}}{STD(AR_{pt})} \qquad (6)$$

where STD (AR_{pt}) is the standard deviation of AR_{pt} for the period from day t=-180 to day t=-11.

The cumulative abnormal returns (CARs) are computed for the period after the event day (day 0 to day +10) and used to capture the overall impact of the announcement effect on shareholders' wealth. They are obtained by summing the ARs over the examination period according to the equation:

$$CAR_{pT1,T2} = \sum_{t=T1}^{T2} AR_{pt} \qquad (7)$$

Where T1 is the beginning of the event period and T2 is the end of the event period. The null hypothesis is that the CARs are equal to zero. This is tested by the following t-statistic:

$$t = \frac{CAR_p}{STD(CAR_p)} \qquad (8)$$

where STD(CAR_p) represents the standard deviation of CAR_p and is estimated as follows:

$$STD(CAR_p) = \sqrt{VAR(AR_{pt}) * T} \qquad (9)$$

where T represents the number of trading days in the interval examined. The variance and the covariance are estimated for the period from day -180 to day -11, (estimation period), since we assume that the variability of the returns should be the same for the period before and after the event.

4. Results

Table 1 depicts the healthcare/pharmaceutical industry portfolio abnormal returns for the examination period ten days before and ten days after the event day, March 11th, 2020, the day that WHO announced that Covid-19 was a pandemic. Based on the results presented in Table 1, we observe that this announcement affected this industry negatively in France from the next day of the information, since the value of the AR0 is equal to 0.0059, (t= 0.4767), not significant statistically, and the importance of AR1 is similar to -0.042, (t= -3.343), significant statistically at the 5% level of a two-tailed test. We observe that the market reaction is also adverse on days 2, 3, and 4, March 13th, 16th, and 17th, respectively, and statistically significant only on March 13th and March 16th, the day of the lockdown announcement by the French government.

The value of AR2 is equal to -0.0294, (t= -2.338), significant statistically at the 5% level of a two-tailed test, the value of AR3 is equal to -0.0649, (t= -5.159), effective statistically at the 1% level of a two-tailed test and the importance of AR4, on March 17th, is equal to -0.0002, (t= -0.019), not significant statistically. It was the first day the announced lockdown was imposed. However, the market reaction was positive and significant on day 5, March 18th, and day 6, March 19th. Specifically, the value of AR5 is equal to 0.0752 (t= 5.977) effective statistically at the 1% level of a two-tailed test, and the importance of AR6 is equal to 0.0448 (t= 3.561) significant statistically at the 5% level of a two-tailed test.

This fact implies that investors regarded this action as good news and reacted positively. Examining the cumulative average abnormal returns (CARs), we see that the market reaction is adverse and significant from day 1 to day five after the announcement, on March 18th, 2020, and then continues to be hostile till day 10, but not statistically significant.

Table 1. *Abnormal Returns of the Examination Period*

Day and Date	Abnormal Returns ARs	t-Statistic of the ARs	Cumulative Abnormal Returns CARs	t-Statistic of the CARs
10: 25/3/2020	-0.021610	-1,718030	-0.02899	-0.72886
9: 24/3/2020	0.011526	0,916186	-0.00738	-0.19560
8: 23/3/2020	-0.011020	-0,875750	-0.01891	-0.53139
7: 20/3/2020	0.008725	0,693601	-0.00789	-0.23708
6: 19/3/2020	0.044804**	3,561496	-0.01662	-0.53923
5: 18/3/2020	0.075193**	5,977224	-0.06142*	-2.18345
4: 17/3/2020	-0.000240	-0,019290	-0.13661**	-5.42978
3: 16/3/2020	-0.064900**	-5,158990	-0.13637**	-6.25864
2: 13/3/2020	-0.029410*	-2,338190	-0.07147**	-4.01728
1: 12/3/2020	-0.042060**	-3,343100	-0.04206**	-3.34310
Day0: 11/3/2020	0.005998	0,476769	0,00599	0.47677
-1: 10/3/2020	0.007763	0,617112		
-2: 9/3/2020	-0.030070*	-2,390050		
-3: 6/3/2020	-0.018180	-1,445130		
-4: 5/3/2020	-0.009640	-0,766680		
-5: 4/3/2020	0.007505	0,596582		
-6: 3/3/2020	0.030428*	2,418752		
-7: 2/3/2020	0.012857	1,022042		
-8: 28/2/2020	-0.035070*	-2,787920		
-9: 27/2/2020	-0.016060	-1,276970		
-10: 26/2/2020	0.000483	0,038381		

Note: *   Indicates significance at the 5% level of a two-tailed test.
         ** Indicates significance at the 1% level of a two-tailed test.
Source: *Own study.*

Therefore, our results contrast with our hypothesis. They are also in comparison to the results for the Chinese pharmaceutical industry (Huo *et al.,* 2020; He *et al.,* 2020) since, based on the optimistic investors' reaction regarding the only other pharmaceutical industry that was investigated so far, in China, we expected positive market reaction from the first day.

A possible explanation for these results, the significant negative abnormal average returns from day 1 to day 3, could be that in Europe, sentiment had a more substantial impact than logic compared to the equivalent reaction of the pharmaceutical industry in China. In other words, the fear and uncertainty that were spread to the people through the media every day by announcing deaths and coronavirus cases affected the citizens' decision-making and, in this case, the investors. As indicated by our results, the latter did not act based on the logic that the pharmaceutical industry would be the most crucial industry during the pandemic crisis. Its operations will not stop or be reduced. Still, instead, there was potential for growth. This result is confirmed empirically regarding COVID-19 sentiments by the studies of Gurav *et al.* (2020), Lee (2020), and Just and Exhaust (2021) we mentioned in the previous section.

On the other hand, the significant positive abnormal returns on days 5 and 6 are related to the lockdown announcement on March 16th (day 3) and not on a change of investors' behavior regarding the pharmaceutical industry of France. Our results are consistent with Alam, Alam, and Chavali (2020), who focused on India and found a significant positive market reaction in the after-lockdown period because investors hoped that it would stop the severity of the disease's spreading and the stock market would benefit.

In India, according to the above study, this post-lockdown reaction was for all the listed companies. In France, we cannot generalize at this point. Future research should investigate the market reaction in all the industries regarding the post-lockdown investors' behavior, and only then complete and thorough inferences can be made.

5. Conclusions

This study investigated the market reaction of the pharmaceutical industry in France to the WHO's announcement that COVID-19 is a pandemic on March 11th, 2020. Contrary to our hypothesis, we found a solid adverse reaction upon this announcement for days 1 to 3. A possible explanation is that in France, investors were frightened by this health crisis and did not react using their logic but let their sentiments govern their decisions. The French investors perceived this announcement as bad news that would upset their lives and create economic havoc in every financial sector.

Therefore, they reacted negatively towards the pharmaceutical industry, not considering that this industry was the only one that could find the cure and stop this

health crisis. It had excellent growth potential, despite the situation in other sectors. Our results found a significant optimistic investors' reaction on days 5 and 6, which were the days after the government's announcement and realization of a total lockdown on March 17th.

Since we cannot make inferences about this fact but only offer possible explanations, future research should address this issue. In other words, we should investigate the market reaction in each industry in France for both events, first at the WHO's announcement of a pandemic on March 11th, 2020, and second at the government's announcement of a lockdown on March 16th, 2020, so that it will be clear the impact of each report to the investors' behavior.

Future research could also be directed towards examining the effects of the equivalent announcements for various industries in Europe and the USA markets and determining the factors that may cause any differences. These results will be necessary for the investors, the academicians, and the policymakers to help them make better decisions regarding the stock markets' operations and investors' protection from health crises turned severe economic ones.

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