

## The COVID-19's Spillover Effects on Industry Indices Returns: Evidence from Casablanca Stock Exchange

Les effets d'entraînement du COVID-19 sur les rendements des indices industriels : Evidence de la Bourse de Casablanca

Auteur 1 : NAIT BOUZID KHALIL,

NAIT BOUZID KHALIL 1, (PhD)

1 Central University of Finance and Economics, Beijing (CUFE), Department of Finance, China  
khalilnaitb94@gmail.com

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## Résumé

Cette étude examine la réaction de la Bourse de Casablanca au COVID-19 en considérant plus particulièrement l'effet d'entraînement des cas et des décès liés au COVID-19 dans cinq pays sélectionnés affectés par le COVID-19, dont le Maroc, sur les rendements des indices industriels de la Bourse de Casablanca du 13 juin 2019 au 11 juin 2020. Cette étude utilise le "modèle VAR-X" (modèles VAR avec des variables exogènes) à cette fin, pour examiner les rendements des indices de l'industrie (variables endogènes) en réponse aux cas et aux décès liés au COVID-19 (variables exogènes). Les résultats empiriques suggèrent l'existence d'effets de d'entraînement significatifs sur les rendements de la plupart des indices industriels, suggérant que la Bourse de Casablanca est plus vulnérable aux situations épidémiologiques d'autres pays. Plus précisément, les résultats suggèrent que les retombées de l'Espagne et de la France sont l'un des facteurs clés qui influencent négativement les rendements de la majorité des indices industriels.

**Mots clés : COVID-19, rendements des indices de l'industrie, Bourse de Casablanca, modèle VAR-X.**

## Abstract

This study investigates the Casablanca Stock Exchange response to COVID-19 by considering more particularly the spillover effect of COVID-19 related cases and deaths of five selected countries affected by COVID-19, including Morocco, on the Casablanca Stock Exchange's industry indices returns from June 13, 2019, to June 11, 2020. This study employs the "VAR-X model" (VAR models with exogenous variables) for this purpose, to examine industry indices returns (endogenous variables) response to COVID-19 related cases and deaths (exogenous variables). The empirical findings suggest the existence of significant spillover impacts on most of the industry indices returns, suggesting that Casablanca Stock Exchange is more vulnerable to the epidemiological situations of other countries. More specifically, the findings suggest that spillovers from Spain and France are one of the key driving factors that influence negatively the majority of industry indices returns.

**Keywords: COVID-19, Industry indices returns, Casablanca Stock Exchange, VAR-X model.**

**JEL Classification: G15, I10, D53**

**Paper type: Empirical research**

## 1. Introduction

The first case of Coronavirus Disease 2019 was discovered in December 2019 in Wuhan, China's Hubei province. In early 2020, the virus spread further in China and to other parts of the world as a result of people migration, resulting in an ongoing pandemic.

On January 30, 2020, the “*World Health Organization (WHO)*” declared the outbreak a “*Public Health Emergency of International Concern*”, requiring international assistance and coordination to combat the disease. As of March 12, 2020, it has been deemed an epidemic. More than 7.34 million cases of COVID-19 had been identified in over 188 countries as of June 11, 2020, resulting in more than 416,434 deaths. There has been a significant increase in the number of cases and deaths, especially in the United States, Italy, the United Kingdom, and Brazil. COVID-19 is currently being debated as to whether it might become a global pandemic.

In China, the spread of COVID-19 had an effect on economic activity. The operation of global supply chains has been disrupted as a result of the Chinese economy slowing and production disruptions. Many manufacturing companies that rely on imported Chinese intermediate inputs have begun to see production shrinking. Global economic activity has also slowed as a result of transportation restrictions. Quarantines, travel bans, and the collapse of many service sector operations have all wreaked havoc on the global economy, causing panic among businesses and consumers who have disrupted normal consumption habits and generated numerous market anomalies.

Various financial and monetary international organizations and forums have cautioned that the novel COVID-19 will have far-reaching and significant implications for the global economy, with consequences that will possibly outstrip the global economic crises of 2007-2008. Harvey, (2020) drew parallels between the Global Financial Crisis and the COVID-19 epidemic crisis, dubbing the current epidemic crisis the "Great Compression." The World Economic Forum asserted that “the coronavirus shock is severe even compared to the Great Financial Crisis in 2007-2008, as it hit households, businesses, financial institutions, and markets all at the same time, first in China and now globally”

With all of these negative consequences, it is evident that the stock market would play a role in these occurrences. Global financial markets have also been affected by the changes, with global stock indexes falling sharply and consistently. The unfortunate circumstance created by COVID-19 provides us with a unique opportunity to assess the financial market effects of an unpredictable and dreaded disease.

This paper focuses on the Moroccan Stock Market for many reasons. First, the future economic response to the pandemic is still very unclear, so it would be important to investigate the inclusion of aspects relevant to the coronavirus in the performance of the Casablanca stock market index in this context.

Second, investors are concerned about the Casablanca stock market's reaction to the COVID-19 pandemic, as it has sparked a cascade of panic and unprecedented uncertainties. Only a few cases had been recorded in Morocco by mid-March, but by the end of the month, the number had exploded. According to the “*Worldometer Data Tracker (WDT)*”, the number of reported cases in Morocco increased exponentially to over 4321 by April 29, 2020, with 168 deaths. According to the literature, as the COVID-19 has spread across the world, it has created considerable volatility in financial markets, increased investor anxiety, and raised negative sentiment about future expected returns, causing global financial markets to become too volatile and stock prices to plunge.

Third, the Casablanca Stock Exchange has delivered a gloomy scenario in the form of an economic crisis caused by the spread of the Coronavirus. In the first quarter of 2020, the Casablanca Stock Exchange's leading indices, MASI and MADEX, dropped to 8987,89 and 7277,97 points, respectively, a decrease of 26.26 percent and 26.81 percent in March, a level never seen before in the Casablanca Stock Exchange's history.

As a result, the primary goal of this research is to look into the Casablanca Stock Exchange's reaction to COVID-19, with a focus on the effects of COVID-19-related cases and deaths on the Casablanca Stock Exchange. For this aim, the VAR-X model will be used to investigate more precisely industry indices returns (endogenous variables) response to COVID-19-related cases and deaths (exogenous variables).

There is a small but quickly growing literature on the impact of COVID-19 on the stock market, Yilmazkuday, (2020) ; Gormsen & Koijen, (2020) and Baker et al., (2020) . However, this study attempts to fill the gap in the literature by investigating the impact of COVID-19 under the context of the frontier market. To the best of our knowledge, this is the first study to examine COVID-19's spillover effects on industry indices in the context of the Casablanca Stock Exchange. Therefore, it is to believe that this study would be able to provide valuable insights to the existing knowledge of this particular topic.

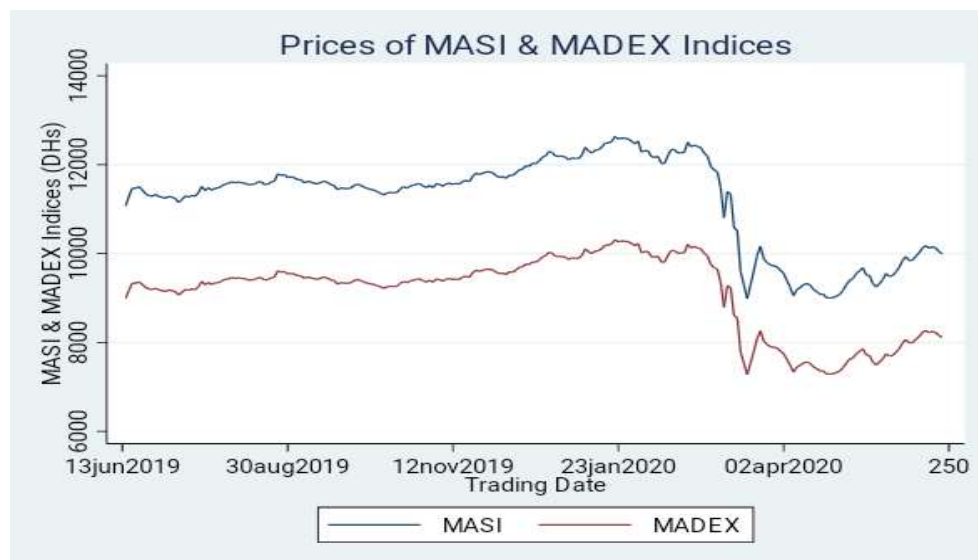
This study will be organized as follow: Section 2 presents a brief background. Section 3 discusses the literature review of previous studies. Section 4 describes the methodology that will be used, the data collection. Section 5 presents the empirical results. Finally, conclusion.

## 2. Background

On December 31, 2019, cases of pneumonia of unknown origin were reported in Wuhan, China, where a new “Coronavirus 2019-nCoV”, later known as “SARS-CoV-2”, was discovered on January 7, 2020. The “World Health Organization” declared COVID-19 a “Public Health Emergency of International Concern” on January 30, 2020, and a pandemic on March 12, 2020, in response to the rapidly evolving international epidemiological situation. Morocco started planning and implementing its national surveillance and response plan for COVID-19 as soon as the virus was first identified.

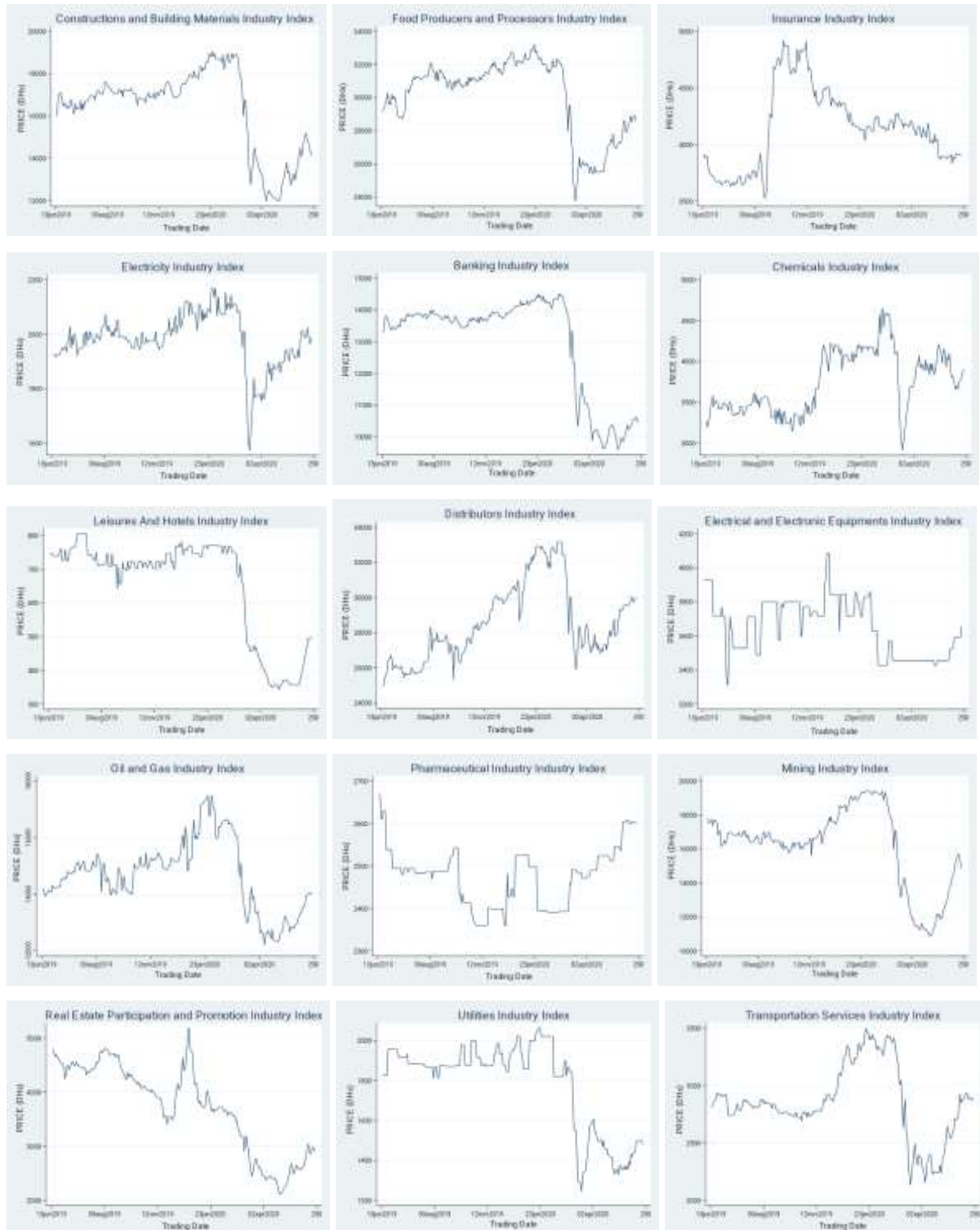
By June 1, 2020, there had been 8455 cases of COVID-19 recorded in Morocco, with 210 deaths. On March 2, 2020, the first COVID-19 case was confirmed in Casablanca. On February 27, 2020, a Moroccan emigrant residing in Bergamo, Italy, arrived from Italy. A second case was confirmed later that day, involving an 89-year-old Moroccan woman who had returned to Morocco from Bologna, Italy, on February 25, 2020. As the epidemic spread through Morocco, the government enforced social distancing strategies on March 16, 2020, including “the suspension of international passenger flights, the closure of land and air, the suspension of education at all levels, the suspension of prayers at mosques, and the lockdown of towns”. Morocco was quarantined on March 19, 2020, and by March 22, 2020, the government had agreed to enforce the Chloroquine Protocol. Morocco's economic activity was unavoidably impacted by these interventions. For example, during March, the MASI and MADEX indices fell to 26.26 percent and 26.81 percent, respectively, a level never seen before in the history of the Casablanca Stock Exchange. (See Figures 1 and 2).

**Figure N°1:** Prices of MASI & MADEX Indices from June 13, 2019, to June 11, 2020



Source: Author's

**Figure N°2:** Prices of Industry Indices from June 13, 2019, to June 11, 2020







Source: Author's

### 3. Revue of literature

The COVID-19 pandemic is a worldwide tragedy with an increasing and significant economic effect. Aside from the dangers to our health, the pandemic's emerging economic implications are important, with financial markets being one of the most visible outlets representing the pandemic's effect on the economy. Baker et al., (2020) argued that the influence of COVID-19-related news on stock market volatility was much greater than other previously reported infectious diseases, such as the “Ebola and SARS epidemics”.

There is an emerging literature documented about the impact of COVID-19 on stock markets. Yilmazkuday, (2020) looked at the influence of COVID-19-related cases in the United States on the S&P 500 Index. The empirical findings indicate that a 1% rise in cumulative daily COVID-19 related cases in the United States induces about 0,01 percent of a cumulative decrease in the S&P500 Index after one day, and about 0,03 percent of a decrease after one month, based on a structural vector autoregression model.

In the same vein, using panel data analysis, Al-Awadhi et al., (2020) tested the effect of the COVID-19 virus on the Chinese stock market. The findings indicate that both the daily growth

in total confirmed cases and total cases of death caused by COVID-19 have significant negative effects on stock returns across all companies.

Sansa & Hasan, (2020) investigated the effect of COVID-19 on the financial markets in the United States and China (New York Dow Jones & Shanghai Stock Exchange). The results indicate that there is a positive significant relationship between the COVID-19 confirmed cases in both financial markets, based on a simple regression model, suggesting that COVID-19 had a significant impact on the financial markets.

Furthermore, the short-run effect of the COVID-19 pandemic on 21 leading stock market indices in major affected countries was investigated by Liu et al., (2020) . The results, based on an event study method, show that stock markets in major affected countries dropped sharply after the virus outbreak. Countries in Asia, in particular, experienced higher negative abnormal returns than other countries. The empirical results also support the negative impact of COVID-19-related cases on stock indices abnormal returns through an appropriate channel by adding up the VIX index as a gauge of investors' fears of uncertainty and pessimistic sentiments on expected returns.

In the same line, Zeren & Hizarci, (2020) looked at the impact of COVID-19-related cases and deaths on stock markets in China, Spain, Italy, South Korea, France, and Germany using daily data from January 23, 2020 to March 13, 2020. According to the empirical evidence, all stock markets with total death move together in the long run, according to the Maki, (2012) cointegration test. Besides, given the rise in COVID-19-related cases and deaths, the findings indicate that investing in the stock market is not the safest choice for investors. However, considering the possibility of investing in gold markets, cryptocurrencies, derivative markets, and stock markets of countries with low COVID-19 could be one of the best ways for investors to alleviate risk.

In understanding the connection between investment decisions and asset price volatility during a disease crisis. Papadamou et al., (2020) examined the effect of a Google trend synthetic index based on COVID-19 as a proxy predictor of searching term on implied volatility in thirteen major stock markets across Asia, Europe, Australia, and the United States. The findings show that increased anxiety induced by increased COVID-19 search queries has a direct effect on implied volatility as well as a secondary impact on stock returns, demonstrating a risk-aversion channel operating during pandemic conditions.

He et al., (2020) investigated COVID-19 spillovers and direct impacts on financial markets in China, France, Italy, Spain, South Korea, Japan, Germany, and the United States. The



empirical evidence indicates that COVID-19 has a negative but short-term effect on stock markets in affected countries, based on traditional t-tests and nonparametric Mann–Whitney tests. Furthermore, the results show that COVID-19's influence on stock markets has bidirectional spillover effects between Asian, European, and American countries. Nevertheless, there is no sign that COVID-19 negatively affects these countries' stock markets more than it does the global average (compared to S&P 1200 Global index).

Using data on daily COVID-19 confirmed cases and deaths, as well as stock market returns from 64 countries from January 22, 2020 to April 17, 2020, Ashraf, (2020) discovered that stock markets reacted negatively to the rise in COVID-19 confirmed cases. That is, as the number of reported cases rose, stock market returns decreased. Furthermore, when the number of confirmed cases increased, financial markets responded more rapidly than when the number of deaths increased. Finally, the findings indicate that stock markets react rapidly to the COVID-19 pandemic and that this reaction differs over time depending on the stage of the outbreak.

In the context of Casablanca Stock Market, Janndi & Moussamir, (2021) investigated the effect of the COVID-19 pandemic on the Casablanca Stock Market using daily data and the event study method. Their findings suggest show that 13 sectors had abnormal returns, with two reacting positively and 11 reacting negatively. Further, the results interestingly document that banking sector was severely impacted, with a reduction of 20.79 percent during the event date, followed by the Materials, Software, and Computer Services sector. The Telecommunications sector, on the other hand, saw a 4.38 percent rise in its stock price.

Similarly, Alami, (2020) conducted a multisectoral analysis of the effect of COVID-19 on the results and performance of various listed stocks. The implication of the findings suggest that companies initially affected and which are in the recovery phase, they need to develop new strategies, to align their goals again with the basis of the current economic situation, while taking into consideration all scenarios likely to arise due to the persistence of this coronavirus. However, for companies seriously affected, they must first measure the extent of the effects of COVID-19 on their results to detect sources of underperformance. Then they have to adjust their predictions underlying the current economic conditions to mitigate the impact of the crisis on their activities.

Using the Dynamic Conditional Correlation Generalized Autoregressive Conditional Heteroskedasticity (DCC-GARCH) model, to estimate the volatility of the Moroccan All-Share Index (MASI) induced by the instability of the financial situation following the pandemic,

Beraich et al., (2021) investigated the effect of the pandemic crisis on the Moroccan stock market, and demonstrated how the containment decisions have negatively impacted the stock market's performance. The findings show that during the study period, the value of the stock market index experienced a major shock and high volatility in its profitability during the period of containment, followed by a period of partial recovery after de-containment.

In addition, Chikri et al., (2020) uses the Non-linear Autoregressive Distributed Lag (NARDL) model, to clarify the relationship between the spread of the Coronavirus and the conduct of the financial markets. The empirical findings conclude that the spread of COVID-19 has a negative effect on the financial market. Furthermore, the positive and negative variations in new cases and deaths caused by COVID-19 have an effect on stock index values.

Harabida & Radi, (2020) examined the impact of the spread of the pandemic on the stock market from February 24, 2020 to May 5, 2020. Their study uses the event study approach, more particularly, the day of the outbreak of the state of health emergency in Morocco, March 16, 2020, is regarded as the day of the event. The findings document the negative influence of the COVID-19 pandemic on the Moroccan financial market. Also, the findings suggest that the market reactions are more important on short event windows, especially on the days surrounding the date of the event, while the reaction is less important on long event windows.

In another perspective, Mdaghri et al., (2020) investigated the effect of the global COVID-19 pandemic on stock market liquidity, taking into account the depth and tightness dimensions, using panel data regression on stock market data covering 314 listed firms operating in six Middle East and North African (MENA) countries. According to the empirical findings, the liquidity associated with the depth measure was positively correlated with the increase in the reported number of cases and deaths, as well as the stringency index. The results also indicate that the liquidity of small-cap and big-cap firms was significantly impacted by the confirmed number of cases, while the stringency index is only significant for the liquidity depth measure. Moreover, the results regarding sectors and country-level analysis confirmed that COVID-19 had a significant and negative impact on stock market liquidity.

In the same line, Hassan et al., (2021) examined the socioeconomic effect of COVID-19 on the MENA region including Morocco, as well as the role and opportunities of Islamic finance in the aftermath of COVID-19. The results indicate that the pandemic has had a huge impact on the MENA region. As this region supplies approximately 69 percent of the world's crude oil, it is exposed to both the COVID-19 pandemic and the fall in crude prices, which is triggered by shocks from both ends, a negative supply shock, and a negative demand shock. Their study

suggests that to alleviate the pandemic's negative impact, some actions have to be taken, such as public fund to help the health system, financial assistance to individuals and small businesses, financial assistance to companies to prevent job loss and layoffs, and guarantee of liquidity in domestic markets to avoid a liquidity shortage. Furthermore, their study explores the role of Islamic finance in the region's recovery following COVID-19, showing that Islamic finance can be used as an alternative financial system to provide relief to COVID-19-affected individuals and businesses.

Bouزيد & Makala, (2021) investigated the Casablanca Stock Exchange response to the COVID-19 by considering the impact of the COVID-19 related cases and deaths of eleven selected countries affected by the COVID-19, including Morocco, on the Moroccan Stock Market (MASI Index), over the period from June 13, 2019, to June 11, 2020. This study employs the GARCH (1,1) model. The Empirical results indicate that in some of the selected countries, changes in the number of cases and deaths related to the COVID-19 have had an impact on the volatility of the MASI Index as well as the MASI Index returns. Furthermore, when using the Markov-Switching model, the results suggest that at the end of February 2020, the COVID-19 pandemic crisis has caused a structural break on MASI Index returns and the relationship between trading volume and MASI index returns has turned negative.

Motivating by the above literature, this study investigates the Casablanca Stock Exchange response to COVID-19 by considering more particularly the spillover effect of COVID-19 related cases and deaths of five selected countries affected by COVID-19, including Morocco, on the Casablanca Stock Exchange's industry indices returns. Hence, this study hypothesizes that industry indices returns will be influenced by the COVID-19's spillover effects.

## 4. Methodology & Data

### 4.1. Data Collection

The dataset used in this study comprises daily industry-level data of the Casablanca Stock Exchange over the period from June 13, 2019, to June 11, 2020. In addition, data on the number of COVID-19 reported cases and deaths at the daily level is collected from the website "<https://ourworldindata.org/>." The daily prices of each industry index are used. In this study, we consider five countries: Morocco, Spain, France, China, and the US.

Log industry returns are calculated as follow:

$$R_{industry,t} = 100 \times (\log \log (IndustryIndexPrice_{i,t}) - \log \log (IndustryIndexPrice_{i,t-1})).$$

For the examination of industry returns indices response to the COVID-19, this study will follow industry classification based on the Casablanca Stock exchange classification.

The variables related to COVID-19 reported cases and deaths are equal to “the first-difference in  $\ln(1 + X_t)$ , where  $\ln$  represents the natural logarithm function and  $X_t$  is either the cumulative reported number of cases (*Total cases*) or the cumulative reported number of deaths (*Total deaths*) at time  $t$ .”

#### 4.2.VAR-X Model

This study implements a “VAR-X model (VAR models with exogenous variables)” to examine industry indices returns (endogenous variables)<sup>1</sup> response to the COVID-19 related cases and deaths (exogenous variables). For the sake of brevity, this study only reports the coefficients on the variables related to reported cases and deaths and does not report the results for the endogenous variables.

### 5. Empirical Results

Table 1 reports the estimated results of the VAR-X model of six industry indices (Food Producers and Processors, Transport, Insurance, Constructions and Building Materials, Banks and Chemicals).

The empirical findings suggest that Food Producers and Processors industry returns are significantly negatively correlated with total cases reported in Morocco, Spain, France, and the US, except for China. While, only weak evidence in France that shows a negative correlation of total death and Food Producers and Processors industry index. For the case of Transport industry returns, total reported cases in Morocco and the US have a significant negative impact as well as a small evidence of negative impact of total reported cases in Spain and France. While, only total deaths reported in France has a negative impact on Transport industry returns. As per Insurance industry returns, no evidence is reported for both total cases and total deaths, indicating that spill-over effects from other countries do not have a significant impact on Insurance industry return. For Constructions and Building Materials Industry returns, both total cases reported in Morocco and Spain, as well as total deaths reported in France have a negative and significant impact. Furthermore, there is a negative and significant spillover effect of total cases reported in Morocco, Spain, France, and the US on the banking industry returns. While,

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<sup>1</sup>“According to the test of optimal lag selection based on Akaike's information criterion (AIC) criterion, the models consider optimal lag selection for each endogenous variable. Onali, (2020) considers COVID-19 related cases and deaths as exogenous variables in a VAR-X framework, while Yilmazkuday, (2020) considers COVID-19 deaths as exogenous variables in a structural VAR framework.”

only total reported deaths in France has negative and significant impact. As per Chemicals industry returns, only total cases reported in Morocco has a negative significant impact, with a small evidence of total cases reported in France.

**Table N°1:** The results of VAR-X models

VARIABLES	(1) Food Producers and Processor s Index	(2) Transpor t Index	(3) Insuran ce Index	(4) Construct ions and Building Materials Index	(5) Banks Index	(6) Chemica ls Index
<i>Total Cases Morocco (ln)</i>	-.0481074 *** (-6.91)	-.043722 *** (-4.22)	-.00126 (-0.16)	-.0571697 *** (-6.33)	-.0509363 *** (-6.85)	-.072397 6*** (-4.81)
<i>Total Deaths Morocco (ln)</i>	.0123461 (1.29)	.0067909 (0.48)	.0039239 (-0.36)	.0030808 (0.25)	-.0009531 (-0.09)	.0432243** (2.10)
<i>Total Cases Spain (ln)</i>	.0233542 *** (-4.17)	.0185101** -2.31	.0060672 (1.02)	.0192843 *** (-2.65)	.025021* ** (-4.27)	.0172788 (-1.53)
<i>Total Deaths Spain (ln)</i>	.0003368 (0.06)	.0024411 (-0.30)	.0078788 (0.184)	-.0066406 (-0.87)	.0021052 (0.34)	.0142373 (-1.24)
<i>Total Cases France (ln)</i>	.0186019 *** (-3.23)	.0160023** (-1.97)	.0026436 (0.43)	-.005925 (-0.80)	.0159694 *** (-2.70)	.0226646* (-1.92)
<i>Total Deaths France (ln)</i>	.0122436 * (-1.66)	.0241773** (-2.30)	.0057395 (-0.73)	.0358094 *** (-3.76)	.0268238 *** (-3.42)	.0047544 (0.32)
<i>Total Cases China (ln)</i>	-.0012197 (-0.34)	.0005872 (0.12)	.0008857 (-0.24)	.0050661 (1.10)	.00355 (0.94)	.0028556 (-0.40)
<i>Total Deaths China (ln)</i>	-.0012512 (-0.18)	.0042999 (-0.43)	.0045145 (0.62)	.0014357 (0.16)	-.002755 (-0.37)	.0036356 (0.26)
<i>Total Cases US (ln)</i>	.0155714 ** (-2.37)	.0324426*** (-3.56)	.0047908 (0.70)	-.0095338 (-1.12)	.0225161 *** (-3.24)	.0015046 (-0.11)

<i>Total Deaths US (ln)</i>	-0.0035618 (-0.50)	.0088309 (0.89)	-0.0073641 (-0.99)	-0.014697 (-1.59)	-0.0013618 (-0.18)	-0.0140933 (-0.98)
Observation	247	246	244	246	244	246

“Notes: The columns with numbers report the results for the daily first-difference in industry returns (in logs) of each industry returns Index. Endogenous variables and constant included but not reported. T-statistics values are reported in parenthesis \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.”

**Source: Author’s**

Table 2 reports the estimated results of the VAR-X model of six industry indices (Electricity, Electrical and Electronic Equipments, Distributors, Leisures and Hotels, Pharmaceutical Industry, Engineering and Equipment Industrial Goods).

The empirical findings suggest that Electricity industry returns are significantly negatively correlated with total cases reported in Morocco and Spain and total deaths reported in France. Distributors industry returns are noticeably and negatively impacted by total cases reported in Morocco, Spain, and China as well as a small evidence of total cases and deaths reported in France. Leisures and hotel industry returns are severely and negatively impacted by total cases reported in Morocco as well as total deaths reported in Spain, France, and the US. While, for the case of Electrical and Electronic Equipments industry returns, Pharmaceutical industry returns, and Engineering and Equipment Industrial Goods industry returns, there is no empirical evidence of a negative and significant COVID-19's spillover effects.

**Table N°2:** The results of VAR-X models

VARIABLES	(7) Electricity Index	(8) Electric and Electronic Equipments Index	(9) Distributors Index	(10) Leisures and Hotels Index	(11) Pharmaceutical Industry Index	(12) Engineering and Equipment Industrial Goods Index
<i>Total Cases Morocco (ln)</i>	-0.0434007* ** -4.47	.0107839 1.13	-0.0250984*** -2.65	-0.0742467*** -5.06	.0023904 0.56	-0.0116741 -0.90
<i>Total Deaths Morocco (ln)</i>	.010658 0.418	.0089658 -0.68	.0035994 -0.27	.0012206 0.06	-0.0017775 -0.30	.0337477* 1.90



	-	-	-	-	-	-
<i>Total Cases Spain (ln)</i>	.0155266* * -2.10	.006578 1 -0.90	.027134 7*** -3.90	.019846 3* -1.78	.001749 0.54	.002818 9 -0.29
<i>Total Deaths Spain (ln)</i>	-.010214 -1.36	.002750 3 0.38	.003665 5 0.50	-.031736 *** -2.78	.0018108 0.56	.005635 4 0.57
<i>Total Cases France (ln)</i>	-.0017606 -0.23	.006433 7 -0.85	.017143 9** -2.39	.009236 7 -0.81	.0011261 0.34	.003248 7 0.32
<i>Total Deaths France (ln)</i>	.0206449* * -2.08	.000765 8 0.08	.019819 9** -2.13	.055335 6*** -3.76	.0013116 0.31	.004704 6 0.36
<i>Total Cases China (ln)</i>	-.0055122 -1.18	.001481 2 -0.31	.018751 2*** -4.38	.000184 1 0.03	-.0011897 -0.59	.004084 4 -0.66
<i>Total Deaths China (ln)</i>	.0128003 1.41	.005729 6 -0.64	.014412 3* 1.71	.001018 2 0.07	-.0006365 -0.16	.000351 5 0.03
<i>Total Cases US (ln)</i>	-.0051926 -0.59	.007949 7 -0.95	-.012814 -1.55	.014784 7 -1.15	.0022055 0.59	.003264 1 -0.29
<i>Total Deaths US (ln)</i>	-.0053525 -0.57	.009560 2 1.05	.002219 3 -0.25	.039021 1*** -2.78	.0003779 0.09	.010404 0.84
Observation	244	245	244	247	247	247

“Notes: The columns with numbers report the results for the daily first-difference in industry returns (in logs) of each industry returns Index. Endogenous variables and constant included but not reported. T-statistics values are reported in parenthesis \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.”

#### Source: Author’s

Table 3 reports the estimated results of the VAR-X model of six industry indices (Materials Software and Computer Services, Real Estate Participation and Promotion, Oil & Gas, Utilities, Investment Companies and Other Finance and Mining).

Materials Software and Computer Services industry returns are negatively correlated with total cases reported in Morocco, Spain, and the US, as well as total deaths reported in France. Similarly, Real Estate Participation and Promotion industry returns, are also negatively impacted by total cases reported in Morocco, Spain and with a small evidence in China. Also,

Oil & Gas industry returns are negatively impacted by total cases reported in Morocco, China, and with a small evidence in Spain. For Utilities industry returns, both total cases reported in Spain and total cases reported in France have a negative impact on Utilities industry returns. For the case of Investment Companies and Other Finance industry returns, the COVID-19's spill-over effect is only pronounced within the total cases reported in Morocco and total deaths reported in France. However, there is weak evidence of a negative impact of both total cases and deaths reported in Spain and the US. Furthermore, Mining industry returns are significantly and negatively correlated with total cases reported in Morocco, Spain and total deaths reported in France as well as a small evidence of a negative impact of total cases reported in France, the US, and total deaths reported in the US.

**Table N°3:** The results of VAR-X models

VARIABLES	(13) Materials, Software and Computer Services Index	(14) Real Estate Participa tion and Promotio n Index	(15) Oil & Gas Index	(16) & Utilities Index	(17) Investme nt Compani es and Other Finance Index	(18) Mining Index
<i>Total Cases Morocco (ln)</i>	- .0490308*** -4.97	- .0548545 *** -3.99	- .028130 2*** -2.61	- .006448 2 -0.51	- .034253 5*** -5.64	- .050041 7*** -5.08
<i>Total Deaths Morocco (ln)</i>	-0.001625 -0.01	.0151979 0.80	.006426 8 -0.44	.009839 4 -0.56	.009216 1.11	.021359 9 -1.59
<i>Total Cases Spain (ln)</i>	- .0236972*** -3.06	- .0328839 *** -3.09	- .018160 6** -2.23	- .017768 ** -2.00	- .008084 9* -1.69	- .028039 1*** -3.55
<i>Total Deaths Spain (ln)</i>	-0.0023961 -0.30	.0169337 1.59	.006649 1 -0.79	.004514 -0.48	.009222 2* -1.89	.004610 5 -0.57
<i>Total Cases France (ln)</i>	-0.0119835 -1.53	- .0160896 -1.45	.010547 6 -1.24	.006917 6 -0.74	-0.005865 -1.20	.015909 8** -2.00
<i>Total Deaths France (ln)</i>	- .0343993*** -3.39	- .0161581 -1.14	.019019 8 -1.74	.026048 1** -2.15	.020123 9*** -3.13	.041354 9*** -4.07

<i>Total Cases China (ln)</i>	.0032434	.0152998 **	.019284 5***	.008853 7	.001922 7	.002677 9
	0.66	-2.29	-3.83	-1.57	-0.63	0.53
<i>Total Deaths China (ln)</i>	.00289	.0083777	.016045	.000311 1	.010358 9*	.001587 7
	0.30	0.64	1.64	0.03	1.70	-0.16
<i>Total Cases US (ln)</i>	.0260123***	.0142122	.011531 6	.007802 3	.009161 3*	.018511 9**
	-2.94	-1.15	-1.21	-0.74	-1.67	-2.04
<i>Total Deaths US (ln)</i>	-.0065937	.0058655	.000517 9	.001954 6	.011196 5*	.019700 8**
	-0.68	-0.43	-0.05	-0.17	-1.87	-1.97
Observation	247	247	246	247	245	247

“Notes: The columns with numbers report the results for the daily first-difference in industry returns (in logs) of each industry returns Index. Endogenous variables and constant included but not reported. T-statistics values are reported in parenthesis \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.”

#### Source: Author’s

Table 4 reports the estimated results of the VAR-X model of six industry indices (Real Estate Investment Companies, Beverages, Forestry & Paper, Holding Companies, Telecommunications Transportation Services).

The empirical findings suggest that Real Estate Investment Companies industry returns are negatively and severely impacted by total cases reported in Morocco, Spain as well as total deaths reported in France. However, there is interesting empirical evidence of a strong and positive correlation between Real Estate Investment Companies industry returns and total reported in both Morocco. For Beverage industry returns, total cases reported in Morocco, Spain, and the US as well as total deaths reported in France have a significant negative impact on the Real Estate Investment Companies index. Similarly, Forestry & Paper industry returns are only negatively impacted by total cases in Morocco, suggesting that there are no COVID-19 spillover effects from the rest of the countries. While, there is empirical evidence of a positive impact of total deaths reported in Morocco. As per, Holding Companies industry returns, total cases reported in Morocco, Spain, and China have a negative impact, as well as total deaths reported in France. For Telecommunications industry returns, total cases reported in Morocco, Spain, and the US have a negative significant impact as well as a small evidence of total deaths reported in France. Furthermore, Transportation Services industry returns have

a negative correlation with total cases reported in Morocco, Spain, France, and the US as well as total deaths reported in France.

**Table N°4:** The results of VAR-X models

VARIABLES	(19) Real Estate Investment Companies Index	(20) Beverages Index	(21) Forestry & Paper Index	(22) Holding Companies Index	(23) Tele-communications Index	(24) Transportation Services Index
<i>Total Cases Morocco (ln)</i>	-.0493888 ***	-.053052 4***	-.074849 1***	-.080544 6***	-.0493364***	-.0708224 ***
	-5.60	-5.24	-4.22	-6.17	-6.36	-6.57
<i>Total Deaths Morocco (ln)</i>	.0316348 ***	.005196 3	.115539 7***	.033390 9*	.0206334**	.0264507 *
	2.64	0.38	4.68	1.86	1.97	1.82
<i>Total Cases Spain (ln)</i>	.0202696 ***	.024259 8***	.001136 9	.023777 **	.0298005***	.0397512 ***
	-2.96	-3.13	-0.08	-2.27	-5.02	-4.76
<i>Total Deaths Spain (ln)</i>	.003601	.004348 3	.012065 3	.016193 8	.0059778	.0051012
	0.51	-0.54	-0.87	-1.50	0.99	0.58
<i>Total Cases France (ln)</i>	-.0059574	.012136 6	.015161 4	-.007317	-.0118574*	.0232661 ***
	-0.84	-1.55	-1.05	-0.68	-1.88	-2.68
<i>Total Deaths France (ln)</i>	.0241077 ***	.036035 2***	.001571 4	.042307 6***	-.0190415**	.0304597 ***
	-2.62	-3.54	0.09	-3.07	-2.34	-2.77
<i>Total Cases China (ln)</i>	-.0033058	.003156 8	.008710 9	.021807 9***	.0001265	-.0000731
	-0.72	0.64	-1.00	-3.37	0.03	-0.01
<i>Total Deaths China (ln)</i>	.0031374	.003433 8	.002518 1	.037312 9***	-.0119914	-.0039196
	0.37	0.35	0.15	2.95	-1.58	-0.37
<i>Total Cases US (ln)</i>	-.015482*	.026789 5***	.011592 2	.018967 6	-.0250161***	.0244823 **
	-1.92	-3.02	-0.72	-1.52	-3.50	-2.46
<i>Total Deaths US (ln)</i>	.0002808	.006724 4	.005298 6	.014153 1	.0025572	-.0043959

	0.03	-0.69	0.30	-1.07	0.738	-0.41
Observation	244	246	244	246	244	246

“Notes: The columns with numbers report the results for the daily first-difference in industry returns (in logs) of each industry returns Index. Endogenous variables and constant included but not reported. T-statistics values are reported in parenthesis \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .”

**Source: Author’s**

### Conclusion

Under the effect of the uncertainty which weighs on the prospects for the Moroccan economy, in connection with the crisis caused by the COVID-19 on an international scale, this study investigates the Casablanca Stock Exchange response to COVID-19 by considering more particularly the spillover effect of COVID-19 related cases and deaths of five selected countries affected by COVID-19, including Morocco, on the Casablanca Stock Exchange’s industry indices returns from June 13, 2019, to June 11, 2020. This study employs the “VAR-X model” (VAR models with exogenous variables) for this purpose, to examine industry indices returns (endogenous variables) response to COVID-19 related cases and deaths (exogenous variables).

The empirical findings suggest the existence of significant spillover impacts on most of the industry indices returns, suggesting that Casablanca Stock Exchange is more vulnerable to the epidemiological situations of other countries. More specifically, the findings suggest that spillovers from Spain and France are one of the key driving factors that influence negatively the majority of industry indices returns.

This study is of great implications in both academia and practice which is beneficial to academic researchers, investors, and policymakers. Firstly, this investigation provides empirical evidence in the context of a frontier market enhancing the existing literature. More specifically, this paper contributes to the current research on the stock markets response to the COVID-19 pandemic and the effects of pandemics in general on financial markets, as well as to the research on the economic impact of the COVID-19. Secondly, for investors, when allocating funds into investments among asset classes and within asset classes, investors should make reasonable investment decisions and consider that prices might deviate from their fundamental values during the COVID-19 period.

Finally, future research could go much further to extend the period, especially in light of various countries' economic recovery plans. Moreover, further research might also help shedding light on taking into consideration the selection of major COVID-19's impacted

countries. Also, further research might investigate the impact of the COVID-19 pandemic on the Casablanca Stock Exchange's volatility and trading volume.

### References:

- Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammedi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance*, 27, 100326. doi:<https://doi.org/10.1016/j.jbef.2020.100326>
- Alami, Y. (2020). Contribution à l'étude de l'impact de la crise sanitaire Covid-19 sur la Bourse des Valeurs de Casablanca. 2(2), 112-131.
- Ashraf, B. N. (2020). Stock markets' reaction to COVID-19: Cases or fatalities? *Research in International Business and Finance*, 54, 101249. doi:<https://doi.org/10.1016/j.ribaf.2020.101249>
- Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The Unprecedented Stock Market Reaction to COVID-19. *The Review of Asset Pricing Studies*, 10(4), 742-758. doi:10.1093/rapstu/raaa008
- Beraich, M., Fadali, M. A., & Bakir, Y. (2021). Impact of the covid-19 crisis on the moroccan stock market. *International Journal of Accounting, Finance, Auditing, Management and Economics*, 2(1), 100-108.
- Bouزيد, K. N., & Makala, U. E. (2021). Casablanca Stock Exchange response to the COVID-19 pandemic. *African Review of Economics and Finance*.
- Chikri, H., Moghar, A., Kassou, M., Hamza, F., & Bourekadi, S. (2020). The Asymmetric Influence of COVID-19 on Financial Market: Evidence From NARDL Model. *Communications of the IBIMA*, 15657-15673.
- Gormsen, N. J., & Kojien, R. S. J. (2020). Coronavirus: Impact on Stock Prices and Growth Expectations. *The Review of Asset Pricing Studies*, 10(4), 574-597. doi:10.1093/rapstu/raaa013
- Harabida, M., & Radi, B. (2020). The Covid-19 Pandemic and the Moroccan Financial Market: An Event Study. *International Journal of Applied Economics, Finance and Accounting*, 7(2), 90-96.
- Harvey, A. C. (2020). The Economic and Financial Implications of COVID-19 *The Mayo Center for Asset Management at the University of Virginia Darden School of Business*



- and the Financial Management Association International virtual seminar series.*  
doi:<https://www.darden.virginia.edu/mayo-center/events/virtual-speaker-series>
- Hassan, M. K., Rabbani, M. R., & Abdulla, Y. (2021). Socioeconomic impact of COVID-19 in MENA region and the role of Islamic finance. *International Journal of Islamic Economics and Finance*, 4(1), 51-78.
- He, Q., Liu, J., Wang, S., & Yu, J. (2020). The impact of COVID-19 on stock markets. *Economic and Political Studies*, 8(3), 275-288. doi:10.1080/20954816.2020.1757570
- Janndi, W., & Moussamir, A. (2021). Stock market reactions to COVID-19: Evidence from Morocco. *International Journal of Management Sciences*, 4(1).
- Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 Outbreak and Affected Countries Stock Markets Response. *International Journal of Environmental Research and Public Health*, 17, 2800. doi:10.3390/ijerph17082800
- Maki, D. (2012). Tests for cointegration allowing for an unknown number of breaks. *Economic Modelling*, 29(5), 2011-2015. doi:<https://doi.org/10.1016/j.econmod.2012.04.022>
- Mdaghri, A. A., Raghibi, A., Thanh, C. N., & Oubdi, L. (2020). Stock market liquidity, the great lockdown and the COVID-19 global pandemic nexus in MENA countries. *Review of Behavioral Finance*.
- Onali, E. (2020). Covid-19 and stock market volatility. *SSRN Electronic Journal*.
- Papadamou, S., Fassas, A., Kenourgios, D., & Dimitriou, D. (2020). *Direct and Indirect Effects of COVID-19 Pandemic on Implied Stock Market Volatility: Evidence from Panel Data Analysis*. Retrieved from <https://EconPapers.repec.org/RePEc:pra:mprapa:100020>
- Sansa, N., & Hasan, A. (2020). The Impact of the COVID -19 on the Financial Markets: Evidence from China and USA. *Electronic Research Journal of Social Sciences and Humanities*.
- Yilmazkuday, H. (2020). COVID-19 Effects on the S&P 500 Index. *SSRN Electronic Journal*. doi:<http://dx.doi.org/10.2139/ssrn.3555433>
- Zeren, F., & Hizarci, A. (2020). The impact of COBID-19 coronavirus on stock markets: Evidence from selected countries. *Muhasebe ve Finans İncelemeleri Dergisi*. doi:10.32951/mufider.706159