THE IMPACT OF COVID-19 SPREAD ON EGYPTIAN STOCK MARKET RETURN

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Abstract

The COVID-19 outbreak is considered as one of the most severe infectious viruses experienced by the world during the 21st century. This pandemic has economic, social, and psychological consequences on all countries, so the main purpose of this paper is to determine the impact of COVID-19 on the Egyptian stock return specifically as Egypt has been one of the countries that were strongly affected. The impact of COVID-19 on the Egyptian Stock Exchange (EGX100) was investigated using a multiple regression model and historical data from 20 listed firms in the EGX100 index between February 2020 and March 2022. Additionally, we included inflation as a control variable in our model. The results indicated that COVID-19 significantly impacted the stock's cumulative returns when used as an independent variable and measured using the cumulative coronavirus cases (CCC) and cumulative coronavirus deaths (CCD) collected for the time period of February 2020 through March 2022 from the World Health Organization (WHO) database. The findings also showed a negative correlation between these elements and the cumulative returns of the stock. Furthermore, The outcome of our model also showed that there was no significant relationship between inflation as measured by headline CPI and the stock's cumulative returns.

Keywords: COVID-19, Egyptian Stock Market Return, Multiple Regression Model, Inflation

Authors' individual contribution: Conceptualization — H.A.B.; Methodology — A.M.E.-Z.; Validation — A.M.E.-Z.; Formal Analysis — H.E.M.; Investigation — I.K.E.-N.; Resources — N.H.M.; Data Curation — N.H.M.; Writing — Original Draft — H.A.B.; Writing — Review & Editing — H.A.B.; Supervision — H.A.B.; Project Administration — H.A.B.; Funding Acquisition — H.A.B.

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1. INTRODUCTION

During the last century, there were many pandemic diseases such as bird flu (N1H1), Middle east respiratory syndrome (MERS), Ebola, severe acute respiratory syndrome (SARS), and COVID-19. COVID-19 is a disease caused by the SARS-CoV-2 virus, first started on a small scale in November 2019 in Wuhan, China then started spreading in late 2019 in China until it became a worldwide disease all the world suffers from. As a result, this virus caused an extraordinarily high incidence of death, culminating in global social isolation and home isolation of over two billion individuals, with tremendous social, economic, and psychological

consequences. political, and economic ramifications. Furthermore, one of the virus's commercial effects was unanticipated disruptions in the flow of goods and services, commodity prices, and financial conditions, resulting in economic disasters in many countries as a result of this impact on China's, Japan's, Europe's and the United States' production and supply chains as well as the world's most important economies (International Monetary Fund [IMF], 2020). The World Health Organization (WHO) designated COVID-19 to be a global pandemic in April 2022, confirmed cases have been 504,440,332 that include 6,222,415 total deaths for 216 nations, areas, or territories having cases, including both developing and industrialized countries (World Health Organization [WHO], 2022). Global financial markets (GFM) have been impacted by COVID-19, which led to continuous downward of the economy heightened risk aversion, and significant uncertainty about the pandemic's future evolution had resulted in extreme volatility in stock markets and other hazardous asset markets, as result financial markets entered a period of risk aversion at the end of February 2020, with major increases in volatility across the board. Stock markets began to fall swiftly, shedding 30% of their market value in a matter of weeks, with the sell-off outpacing the global financial crisis (GFC) of 2008. Overall, stock markets have been badly affected by the COVID-19 outbreak but have recovered significantly with the announcement of the rescue scheme. As a result, determining the impact of the COVID-19 epidemic on the stock market is critical.

All economic and other sectors all over the world were affected by the successive crises previously talked about, but the impact of the pandemic was the most influential, due to the huge increase in the number of cases and deaths. The world imposed strict precautionary measures, which were in preventing gatherings completely, stopping air traffic and navigation in all its forms, and closing airspace between countries and each other except in exceptional cases with the application of all precautionary measures, but some countries that have witnessed significant increases in the number of injured and deaths have imposed a complete closure represented. Accordingly, the closure situation caused huge losses in the returns of economic activities and sectors, especially the financial markets, where the financial market indicators achieved losses as Governments' COVID-19 prevention policies have had an impact on the stock market, especially shutdown policies, which disrupt decision-making processes in many financial institutions, making it difficult to react quickly and trade quickly. As a result, in the event of a scarcity of electronic infrastructure, some financial institutions may be forced to close, and traders may be unable to make transactions. Of course, if a major fraction of trade is automated and the economy is technologically advanced, these will play a smaller role; consequently, the potential impact in emerging economies may be greater than in industrialized ones. It is worth mentioning that, even if businesses are not entirely shut down, soft regulations may have an indirect impact on financial markets. in addition, COVID-19 policies can affect the stock market through policy responses to changes in the future economic environment and deteriorating economic conditions may lead to changes in companies' cash flow expectations and an increase in the risk premium, making investors less willing to invest in risky assets like stocks. Behavioral and psychological issues can also affect investors. This means that when there is unfavorable news concerning government limitations, investors are hesitant to examine their holdings.

In March 2022, Egypt recorded 511,977 cases and 24,522 deaths. Although the impact of COVID-19 on the performance of the Egyptian economy was having a positive economic growth rate of 6.3% by the end of 2020 for the financial markets. The main index of the Egyptian Stock Exchange (EGX30) has reduced by 39% since it recorded EGP 10,154 on April 16, 2020. The purpose of this study is to investigate the impact of COVID-19 on stock returns for twenty different companies in EGX100 to indicate if it has affected the stock cumulative returns positively or negatively or no effect. To do this, we will a linear multiple regression model to examine the impact using the total death cases, and total cases, to measure COVID-19 and the headline CPI to measure the inflation rate that is used as a control variable in our model.

Thus, the study is organized as follows. The literature review on the relationship between COVID-19 and stock return, as well as the effects of the inflation rate as a control variable, is presented in Section 2. Section 3 explains the methodology we used in this research. The research results and discussion are detailed in Section 4. Section 5 provides the concluding remarks and limitations of the study and proposes future research agenda on the topic.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Around the world, several well-known factors, such as interest rates, inflation rates, exchange rates, etc., frequently have an impact on stock returns, along with rumours, trends, and market attitude as shown in buyer and seller behaviour. Since 2020, COVID-19 has been the trend and the outbreak that has impacted the entire economy. The EGX100 has fully felt the effects of the global unrest since the first instance of COVID-19 in Egypt was reported in the first week of March, wiping out all of the gains it had made since the year 2020. Despite this, some recent research articles concluded that the pandemic had little impact on the Egyptian stock market and supported their finding that the gross domestic product (GDP) had increased during this time. This led the authors of this article to investigate the effect of COVID-19 on the return on the Egyptian stock market as measured by (cumulative total death and cumulative total cases) in addition to the inflation rate as a control variable.

Elsayed and Abdelrhim (2020) investigated the effects of COVID-19 on the EGX's sectoral indexes in 2020. The daily number of "COVID-19 cases" and "COVID-19 deaths" has been used to measure the spread of the coronavirus. In terms of the population of Egypt, it is also assessed by "new COVID-19 cases" and "new COVID-19 deaths". The returns of the daily sectoral indicators for the Egyptian stock market serve as the dependent

variable, which represents how the Egyptian exchange stock market responded to the spread of the coronavirus. This has been applied on daily basis over the period The findings of the study suggest that between March 1, 2020, and May 10, 2020, the stock prices of these companies are generally unfavorably impacted.

Moreover, Arafa and Alber's (2020) investigation into the effects of the spread of the coronavirus on the MENA (Middle East and North Africa) region's capital markets. The stock market return is evaluated by the stock market index, whereas the coronavirus has been measured by the cumulative total cases, cumulative total deaths, new cases, and new deaths. This was implemented daily between March 1, 2020, and July 24, 2020, on the stock exchanges of seven nations (Egypt, Jordan, Morocco, Qatar, Saudi Arabia, United Arab Emirates, and Tunisia). According to the findings, both cumulative and new COVID-19 mortality had a negative impact on stock market returns in the MENA countries. Throughout the entire period, each country underwent a robustness check, which revealed a significant impact of cumulative coronavirus cases.

In addition, Awad (2020) looked into how the COVID-19 pandemic affected the stock returns of Egyptian companies. The findings demonstrate that the daily increase in the total number of confirmed cases and deaths has had a significantly negative impact on stock returns across all listed firms in the EGX30 index using historical data from listed businesses in the EGX30 index from February 16, 2020, to May 21, 2020. Two proxies were used to examine the COVID-19 pandemic in order to accomplish this purpose: 1) daily increases in the number of confirmed deaths and cases overall; 2) the daily total of COVID-19 cases and fatalities. The results demonstrated that when utilizing the panel data regression approach, daily increases in the total reported cases and the total instances of COVID-19-related mortality have a substantial negative influence on stock returns for all enterprises. Additionally, daily cumulative COVID-19 fatalities are positively correlated with stock returns while daily cumulative COVID-19 cases are negatively correlated with stock returns.

Furthermore, Corbet, Hou, Hu, Lucey, and Oxley (2021) used hourly daily returns from March 11, 2019, to March 10, 2020, to examine the stock performances of six corporations with COVID-19 and some companies with related names that had a negative effect in order to analyze the dynamic correlations and determine whether or not there is a significant effect. The findings show that, in addition to the actual economic impact, the coronavirus pandemic had adverse knock-on effects on several businesses with comparable names. The effect of coronavirus-related information on the volatility of equities markets worldwide, in the U.S., and across subsectors was examined by Haroon and Rizvi (2020). Volatility is caused by the expanding panic index and affects a number of global industries, including energy, travel, leisure, automobiles and parts, and transportation. The impact of the information on market returns and volatility in well-known stocks may be obvious runs from January 1, 2020, till April 30, 2020.

Based on the total number of cases as the dependent variable, Alber (2020) looked into how the spread of the coronavirus affected the stock markets of the six worst-affected nations. As the independent variable, cumulative cases, new cases, cumulative deaths, and new deaths have been used to measure the spread of the coronavirus. While stock market return is tracked by changes in the stock market index, coronavirus spread has been quantified in terms of numbers per million of the population. From March 1, 2020, to April 10, 2020, this document was used daily. Results indicated that the coronavirus had a detrimental impact on stock market returns in China, France, Germany, and Spain. However, these impacts have not been validated for Italy or the U.S. Additionally, stock market return appears to be more sensitive to coronavirus cumulative indications than to new cases, and to coronavirus cases than to deaths.

As well, Khatatbeh, Hani, and Abu-Alfoul's (2020) investigation of the effects of the COVID-19 pandemic on international stock markets aims to investigate how COVID-19 immediately affects stock market indexes in impacted countries. This study uses the daily data series of stock price indices and an event study approach. This is because evidence from eleven major stock market indices shows that the first confirmed COVID-19 case announcement had a significant negative influence on the returns. Additionally, these effects were intensified after COVID-19 was classified as a global pandemic by the WHO on March 11, 2020. The rapidly spreading COVID-19 has devastated international financial markets and crippled the economies of the affected nations. The results of this study shed some light on COVID-19's potential economic and social costs, which regulators and other stock market stakeholders find concerning. The results suggest that investors' worries about COVID-19's possible detrimental economic effects have been reflected in stock markets. Additionally, the stock markets' delayed response in terms of meaningful CARs points to an underreaction to the news of the epidemic. A list of potential research topics is created as a result of these findings. Furthermore, The influence of the COVID-19 pandemic on the stock market in Saudi Arabia was the subject of an investigation by Al-Zyadat and Asfoura (2021). The Tadawul All Share Index (TASI), a daily closing stock market price index, and the number of daily COVID-19 infection cases from March 15, 2020, to August 10, 2020, were both used in the study. This study makes use of the autoregressive conditional heteroscedasticity (ARCH), impulse response function (IRF), and vector auto-regressive (VAR) models. The correlation matrix and IRF results show a negative link between stock market returns and the rise in COVID-19-infected cases during the pandemic. The outcomes of the ARCH model demonstrated that the COVID-19 pandemic had a significant effect on the performance of the stock market of the Kingdom of Saudi Arabia (KSA). The results also showed that there was a massive negative market response in the early stages of the COVID-19 outbreak. The data show that the Saudi Arabian stock market responded quickly to the COVID-19 epidemic, but that the response changed over time depending on the pandemic's stage. The correlation matrix between stock market returns and COVID-19 infection cases shows a weak and negative relationship between stock market

returns and COVID-19 infection cases, with an estimated coefficient of (–0.007). Further, using data from 201 Nigerian enterprises, Raifu, Kumeka, and Aminu (2021) investigated how stock market returns responded to shocks from the coronavirus outbreak and the lockdown policy. The first part looks at how daily increases in COVID-19 confirmed cases and fatalities affect stock returns. The second part looks at whether or not stock returns for Nigerian firms are impacted by daily increases in COVID-19-related cases and fatalities worldwide. The main findings indicated that COVID-19 reported cases have a negative impact on stock market returns both locally and globally. Concerned about the rise in domestic corona deaths, however, the stock market returns in Nigeria responded to confirmed COVID-19 cases and deaths globally more strongly than they responded to domestic events. Moreover, Wang, Zhang, Zhang, Gao, and Lin (2021) used generalized autoregressive conditional heteroscedasticity to examine the relationship between COVID-19 and financial reaction in China (GARCH). It was discovered that the pandemic had a substantial, adverse effect on the stock prices of companies listed on the Shanghai Stock Exchange (SSE), Shenzhen Stock Exchange (SZSE), and ChiNext. But there is significant variability across various industries: negative effects were particularly noticeable in contact-intensive industries including tourism, retail, and catering, whereas businesses in the healthcare and telecommunications sectors performed well. The production and investment in the healthcare industry were driven by the enormous demand for masks, antiviral medications, and other associated products.

The current study employed secondary data from DataStream and Bloomberg between January 2, 2020, and May 29, 2020, to examine the influence of the COVID-19 pandemic on the Malaysian stock market. Mehmood, Mohd-Rashid, Aman-Ullah, and Tajuddin (2021) investigated the reaction of the Malaysian stock market to the COVID-19 pandemic. The results showed that the performance of the KLCI (Kuala Lumpur Composite Index) and all sectoral indices over the various periods was negatively impacted by the COVID-19 epidemic. The performance indices for energy, real estate, and finance were the poorest, while those for healthcare, technology, telecommunications, and media had the least influence. All thirteen sector indexes have been declining since January, and they have now reached their lowest point during the second COVID-19 wave, according to the data. The response of the Egyptian stock market to the COVID-19 pandemic was examined by Abouelfarag and Qutb (2022). Examining how the new coronavirus (COVID-19) impacted Egyptian stock market returns and volatility from July 2018 to June 2021 is the goal of this study. A GARCH model is used to examine how COVID-19 impacts two fundamental stock market indices (EGX30 and EGX100). Separating the impacts of each consecutive pandemic wave also required the application of the heteroskedasticity corrected model (HCM). All COVID-19 variables have an impact on EGX100 daily returns but not EGX30 daily returns, according to the GARCH model. The mortality rate and transmission speed increased, increasing the market volatility of EGX30 daily returns. According to the HCM's findings, the first wave caused the Egyptian stock market to become tenser than the second, with no effect on the third wave. Investors and policymakers might use this information to help them deal with the unfavorable effects of unforeseen events. To ensure economic stability, the Egyptian government can implement fiscal stimulants and take measures to counteract the pandemic's effects. This study is one of the first to make an effort to separate the effects of potential pandemic waves on the Egyptian stock market, one of the continents of Africa's largest economies.

On the other hand, some studies did not find a significant relationship between COVID-19 and market return. For instance, Cepoi (2020) used a panel quantile regression model to examine stock exchange reactions to COVID-19-related news in the six most affected developed nations (France, Germany, Italy, Spain, the U.S., and the U.K.). The results revealed that the news has an uneven impact on financial markets. The results indicate that changes in COVID-19 news have little to no effect on stock market returns. However, there is compelling evidence that stock market volatility in European markets is increased by changes in COVID-19 news. In no market are the calculated coefficients of the COVID-19 news changes noteworthy. Future studies might look more closely at whether the effects of good and negative news on financial markets differ in some way. Similarly, the impact of the COVID-19 pandemic on the unusual fluctuations (or abnormal returns[1]) in Chinese stock prices was examined by He, Sun, Zhang, and Li (2020). Time frame of this study was applied from June 3, 2019 to March 13. The regression findings demonstrated that there were no appreciable fluctuations in the overall stock value of the Shanghai and Shenzhen A-share markets.

To achieve the objectives of the study and to provide an understanding of the impact of COVID-19 on the stock returns of EGX100 companies, the following hypotheses are adopted:

H_0: There is no effect of COVID-19 on stock prices.

H1: There is an effect of COVID-19 on stock prices.

3. RESEARCH METHODOLOGY

3.1. Data description

The data used in this study were extracted from yahoofinance.com[2]. The data consists of a sample of twenty stocks from the Egyptian Stock Exchange (EGX100) together with the total number of deaths and cases in Egypt due to COVID-19[3] as well as the control variable is inflation measured by headline CPI[4]. These stocks are from ten different sectors and are listed in the EGX100 index. The different sectors are banks, information technology, health care, industrial goods sector, food and beverages, shipping and transportation

[1] The return produced by a certain company or portfolio over a period of time that is larger than the return produced by its benchmark or the expected rate of return is known as the abnormal rate of return, or "alpha". It serves as a risk-adjusted performance indicator.
[2] https://finance.yahoo.com/quote/%5EEGX100EWI.CA/history?p=%5EEGX100EWI.CA
[3] https://covid19.who.int/
[4] https://www.cbe.org.eg/ar/MonetaryPolicy/Pages/Inflation.aspx

services, education services, non-bank financial services, travel and leisure, real estate, and basic resources industries. Equal weights of companies were selected from all industries and two companies from each industry were chosen to be included in the study.

Daily cumulative returns stock data covering the period from February 2020 to March 2022 is used for the analysis. The analysis is performed using SPSS version 24.

3.2. Dependent and independent variables

The dependent variable used in the regression model is the daily cumulative returns of the stocks in the sample.

Independent variables:

- The percentage change in the total number of deaths due to COVID-19 in Egypt.
- The percentage change in the total number of COVID-19 cases in Egypt.
- Inflation measured by headline CPI (control variable).

3.3. Methodology

First cumulative returns are calculated from the raw stock prices and the data is checked for any potential errors. Also, the percentage change in total deaths and total cases is calculated. A descriptive analysis is first performed for both the stocks in the sample and the variables of the regression model to gain a deeper understanding of the data at hand.

Next, a correlation matrix between the regression variables is computed to assess the linear relationship between the variables and test its statistical significance.

Finally, a multiple regression model is built using the cumulative stock returns as the dependent variable, the percentage change in COVID-19 deaths with the percentage change in total cases together as the independent variables, and the inflation rate (headline CPI) as the control variable. The empirical model used to examine the determinants of the stock's cumulative return is specified as:

$$\hat{y} = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 \quad (1)$$

where:

$\hat{y}$ represents the estimated value of the cumulative stock returns;

X_1 represents the percentage change in COVID-19 deaths;

X_2 represents the percentage change in total cases;

X_3 represents the inflation rate (headline CPI) as a control variable.

The overall model is tested for significance using the F-test, and the coefficients of the regression model are tested using the T-test. The adjusted coefficient of determination is used in assessing the model fit. In addition, the assumptions of the regression model are also validated and checked.

These assumptions are mainly:

- *Linear functional form*: In which the response variable (dependent variable) should be linearly related to the explanatory variables (independent variable). This assumption is inspected visually by plotting the dependent variable against each of the independent variables.
- *The regression model residuals should be normally distributed*: This assumption is checked by constructing a histogram and a P-P (probability-probability plot) of the residuals.
- *Homoscedasticity of the residuals*: The residual errors should have a constant variance. This is inspected visually by plotting the unstandardized residuals against each independent variable.
- *Multicollinearity*: There should be no perfect multicollinearity in the regression model. A variance inflation factor (VIF) is computed and assessed. The VIF value should be less than 10 to say that the model contains no multicollinearity.

4. RESEARCH RESULTS AND DISCUSSION

4.1. Regression analysis

In the univariate descriptive analysis, the average cumulative stock return is 20% [std. dev. = 0.46 (or 46%)] and the average total death due to COVID-19 is 11,284 [std. dev. = 7,541] during the period of study. In addition, the average number of cases is 202,712 [std. dev. = 138,673] and the average headline CPI is 0.5% [std. dev. = 0.006 (or 0.6%)]. The total deaths and total cases from COVID-19 have been more deviated than the stock's cumulative return. This may be attributed to the widespread of the disease. Whereas stock cumulative returns have also been changed but at a regular rate. The maximum cumulative stock return observed during the study period is 285% and the minimum observed is -63%, Table 1 provides the summary statistics for the stock's cumulative returns, total death, percentage death, total cases, percentage cases, and headline CPI.

Table 1. Summary statistics for the data

Parameter	*Range*	*Min*	*Max*	*Mean*	*Std. Dev.*	*Skewness*	*Kurtosis*
Stock CR	3.479	-0.626	2.852	0.205	0.460	1.010	1.150
Total death	24361	0.000	24361	11283.867	7541.141	0.073	-1.237
%Δ total death	1.333	0.000	1.333	0.023	0.100	9.055	94.406
Total cases	500888	1.000	500889	202712.129	138673.042	0.293	-0.888
%Δ total cases	15.333	0.000	15.333	0.053	0.681	22.113	493.376
Headline CPI	0.022	-0.004	0.018	0.005	0.006	0.476	-0.674

The summary statistics for the twenty stocks' cumulative returns are provided in Table 2. The highest average cumulative return (75%) is for Alexandria National Company for Financial Investment (*ANFI_CR*) company and the lowest average cumulative return (-31%) is for Orascom Investment Holding (*OIH_CR*). The maximum cumulative return observed is for Development & Engineering Consultants Co. (*DAPH_CR*) reaching up to 285% and the minimum cumulative return observed is for *OIH_CR* reaching -62.6%.

Pearson's correlation coefficients are calculated for the variables of interest together with a simple correlation test of the correlation coefficients. The results are shown in the correlation matrix. From this table, it is evident that:

- There is a highly statistically significant negative linear relationship (p-value < 0.01) between the stock's cumulative returns and the percentage change in the number of deaths due to COVID-19. This relationship is however considered weak.
- There is a highly statistically significant negative linear relationship (p-value < 0.01) between the stock's cumulative returns and the percentage change in the total number of cases. This relationship is however considered very weak.
- There is a very weak and insignificant positive relationship (p-value = 0.29) between headline CPI and the stock cumulative returns.

Table 2. Summary statistics for each stock cumulative return

Variable	*Minimum*	*Maximum*	*Mean*	*Std. Dev.*	*Skewness*	*Kurtosis*
ABUK_CR	-0.384	0.368	-0.004	0.138	-0.789	0.296
DAPH_CR	-0.394	2.852	0.423	0.618	1.835	3.199
AMER_CR	-0.151	1.358	0.490	0.364	0.249	-0.822
ELWA_CR	-0.206	1.746	0.717	0.540	-0.093	-1.277
EGTS_CR	-0.526	0.195	-0.302	0.124	1.578	2.328
ANFI_CR	-0.248	1.590	0.748	0.575	-0.552	-1.344
ATLC_CR	-0.310	1.425	0.380	0.417	0.249	-0.935
CIRA_CR	-0.284	0.137	-0.044	0.091	-0.488	-0.152
OIH_CR	-0.626	0.272	-0.308	0.262	0.569	-1.21
UASG_CR	-0.492	1.641	0.512	0.443	-0.073	-0.364
ETRS_CR	-0.414	0.981	0.173	0.282	0.273	-0.427
GSSC_CR	-0.259	1.495	0.377	0.401	0.393	-0.446
SWDY_CR	-0.421	0.052	-0.162	0.096	-0.028	-0.513
CPCI_CR	-0.168	0.335	0.152	0.122	-0.702	-0.518
NINH_CR	-0.150	1.123	0.446	0.400	-0.245	-1.580
ETEL_CR	-0.353	0.569	0.058	0.168	0.686	-0.038
MPRC_CR	-0.481	0.743	0.160	0.278	-0.352	-0.497
COMI_CR	-0.427	0.006	-0.260	0.070	0.562	1.928
SAUD_CR	-0.232	0.481	0.123	0.202	-0.285	-1.232
SIPC_CR	-0.354	1.029	0.411	0.303	-0.235	-1.035

A multiple regression model is built using the cumulative stock returns as the dependent variable ($\hat{y}$) and the percentage change in COVID-19 deaths (X_1), the percentage change in total cases (X_2), together with headline CPI (X_3), as the control variable. The results of the regression model are presented in Table 4. The multiple regression equation can be written as:

$$\hat{y} = 0.217 - 0.759X_1 - 0.027X_2 + 1.275X_3 \qquad (2)$$

The coefficients of the regression model can be interpreted as:

$b_1 = -0.759$, when the percentage change in COVID-19 deaths increases by 1%, the stock cumulative returns are expected to decrease by -0.759% on average, while holding other variables constant;

$b_2 = -0.027$, when the percentage change in COVID-19 cases increases by 1%, the stock cumulative returns are expected to decrease by -0.027% on average, while holding other variables constant.

$b_3 = 1.257$, when headline CPI increases by 1%, the stock cumulative returns are expected to increase by 1.257% on average, while holding other variables constant.

Table 3. Correlation matrix between the variables

Parameter		*Stock CR*	*%Δ death*	*%Δ cases*	*Headline CPI*
Stock CR	Pearson correlation	1	-0.167**	-0.050**	0.010
	Sig. (2-tailed)		0.000	0.000	0.293
%Δ death	Pearson correlation	-0.167**	1	0.056**	0.035**
	Sig. (2-tailed)	0.000		0.000	0.000
%Δ total cases	Pearson correlation	-0.050**	0.056**	1	0.012
	Sig. (2-tailed)	0.000	0.000		0.239
Headline CPI	Pearson correlation	0.010	0.035**	0.012	1
	Sig. (2-tailed)	0.293	0.000	0.239	

*Note: ** Correlation is significant at the 0.01 level (2-tailed).*

Table 4. Estimates of the regression model (T-test)

Parameter	*Unstandardized coefficients*		*Standardized coefficients*	*t*	*Sig. (p-value)*	*Collinearity statistics*	
	B	*Std. Error*	*Beta*			*Tolerance*	*VIF*
(Constant)	0.217	0.006		36.809	0.000		
Change total death	-0.759	0.045	-0.165	-16.960	0.000	0.996	1.004
Change total cases	-0.027	0.007	-0.041	-4.165	0.000	0.997	1.003
Headline CPI	1.275	0.745	0.017	1.710	0.087	0.999	1.001

Table 5. ANOVA table (F-test)

Parameter	*Sum of squares*	*df*	*Mean square*	*F*	*Sig.*
Regression	64.717	3	21.572	104.979	0.000
Residual	2103.398	10236	0.205		
Total	2168.114	10239			

Table 6. Model fit

R	*R^2*	*Adjusted R^2*	*Std. Error of the estimate*
0.173	0.030	0.030	0.453

The coefficient of determination and the adjusted coefficient of determination in Table 6 indicate that only 3% of the total variation in the stock cumulative returns is explained by the variations in the percentage change in COVID-19 deaths (X_1), the percentage change in total cases (X_2) and headline CPI (X_3). The remaining variation (97%) remains unexplained by the model.

It is also apparent from Table 4, that the p-values of the coefficients b_1 and b_2 are less than the 1% level of significance. This indicates that the parameters for the percentage change in COVID-19 deaths (X_1) and the percentage change in total cases (X_2) is significantly different from zero. As for headline CPI, the p-value is 0.087, which is insignificant at the 5% level of significance but significant at the 10%. The p-value for the analysis of variance (F-test) in Table 5 is less than the 1% level of significance. This suggests that the overall regression model is significant and can be used for prediction.

4.2. Model validations and assumptions checking

Concerning linearity, Figure 1 shows a scatter plot of the dependent variable (stock cumulative returns) against each of the independent variables. There appears to be a linear relationship between the dependent variable and each of the independent variables.

The regression model residuals appear to be slightly deviated from normal distribution as evident from the P-P plot of the unstandardized residuals in Figure 2 and the histogram of the standardized residuals in Figure 3.

Figure 4 shows the scatter plot between the unstandardized residuals and each of the independent variables. A random pattern is observed which indicates that the residuals are homoscedastic. At last, the VIF values computed in Table 4 estimates of the regression model are extremely small and are all less than 10. This indicates that there is no multicollinearity in the regression model.

Figure 1. Scatter plot of the dependent variable against each of the independent variables

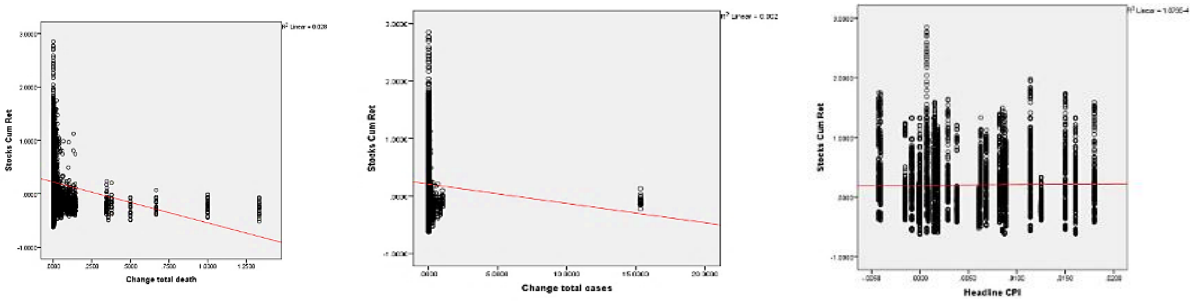


Figure 2. P-P plot of unstandardized residuals

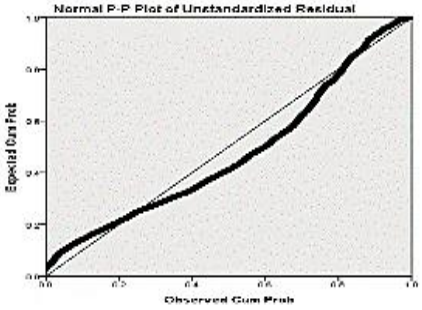


Figure 3. Histogram of the standardized residuals

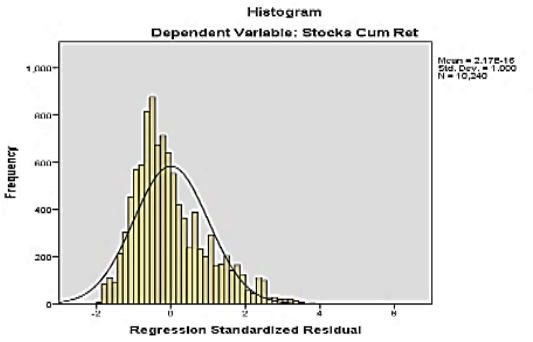
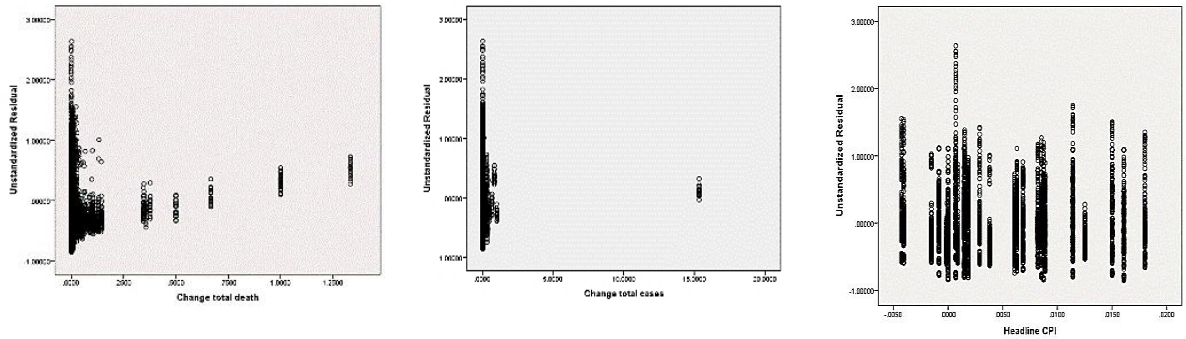


Figure 4. Scatter plot between the unstandardized residuals and each of the independent variables



5. CONCLUSION

The main purpose of this research paper was to determine the effect of COVID-19 on the Egyptian stock market returns. Using a multiple regression model, the results showed that the COVID-19 pandemic measured by the percentage change in the total number of deaths and the percentage change in the total number of cases do have a significant effect on the Egyptian stock market. Although the model's coefficient of determination, R^2 was low (0.03), the overall model was significant. The results also showed that there is a negative relationship between these factors and the stock's market returns. The results of the model also showed that there was no significant relationship between inflation as measured by headline CPI and the stock market returns.

The empirical results reported herein should be considered in light of some limitations where only inflation was used as a control variable, secondly, our sample size was relatively small. Moreover, a multiple regression model using Microsoft excel was used to run out the test. For future research endeavors, it is advisable to increase the sample size, and since COVID-19 is still existing recent papers can use a larger span of time which will make the results more precise. Other independent variables can also be included, besides incorporating further control variables such as interest rate and another exchange rate some additional control variables should be considered for robustness checks. Additionally, using other models other than the multiple regressions model such as the Breusch-Pagan test and an advanced program to run the model such as EViews or SPSS might have resulted in different and more accurate findings.

It is also fairly common in panel models to include year and country fixed effects to account for an omitted factor bias. The paper currently does not mention if such fixed effects are used. Moreover, daily returns are noisy and have microstructure issues like nonsynchronous trading and bid-ask bounces, especially in markets with low liquidity. With such issues, today's COVID deaths and cases may move returns today for some stocks and tomorrow for others. To capture the full effect of COVID-19, it is advisable that future research should include lagged values of the variables and controls for liquidity in the regression model.

The findings have policy implications, in which the evolution of the COVID-19 pandemic is hindering the return of the stock market. Hence, the primary policy recommendation for policymakers is to contain the pandemic speedily to save human lives as a priority and to retain the performance of the stock market. International co-operation has to take place to provide vaccination for all countries, in addition, to media campaigns to encourage residents to get vaccinated against COVID-19. Besides, macro-prudential measures have to be implemented along with monetary and fiscal policies to mitigate the risk and retain the credibility of the financial markets. Yet, the macroeconomic policies have to be complemented with social measures to restore the health system and contain the uncertainty and ambiguity on both economic and social grounds.

Egypt is advised to follow the zero-COVID-19 strategy that was successfully implemented in Australia, New Zealand, South Korea, and some OECD countries. The zero-COVID-19 strategy is a strategy of control and maximum suppression, known as *Find, Test, Trace, Isolate and Support* (FTTIS). The intention behind the strategy is to keep the transmission of the virus as close to zero as possible and to eliminate it entirely from particular geographical areas. Thus, the health system is prevented from overloading at every level of care. In addition, the physical and emotional health of citizens and health professionals is protected along with preserving social and economic life and increasing the trust and commitment of society as a whole (Philippe & Marques, 2021).

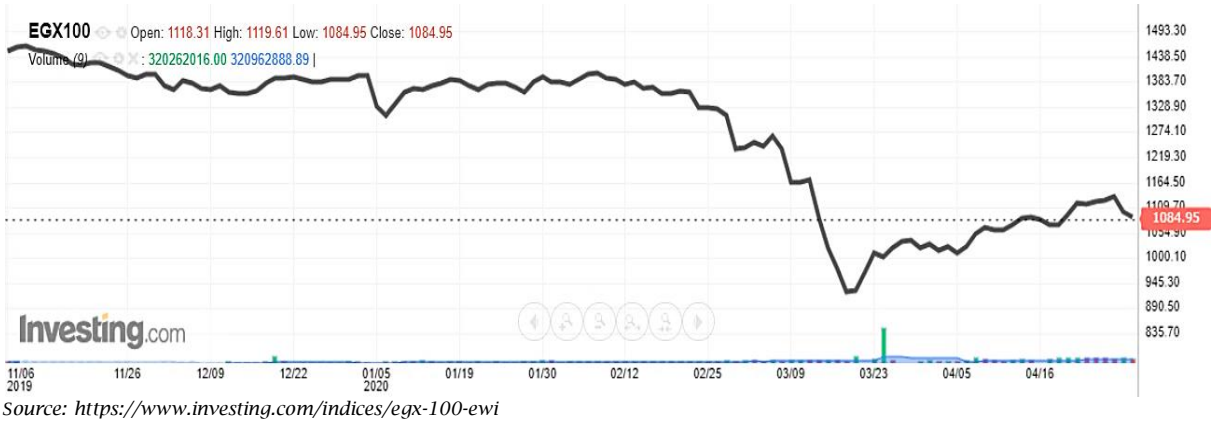
REFERENCES

1. Abouelfarag, H. A., & Qutb, R. (2022). The Egyptian stock market's reaction to the COVID-19 pandemic. *African Journal of Economic and Management Studies, 13*(2), 251–267. https://doi.org/10.1108/AJEMS-10-2021-0461
2. Al-Zyadat, J. A., & Asfoura, E. (2021). The effect of COVID-19 pandemic on stock market: An empirical study in Saudi Arabia. *The Journal of Asian Finance, Economics and Business, 8*(5), 913-921. https://doi.org/10.13106/jafeb.2021.vol8.no5.0913
3. Alber, N. (2020, April 16). *The effect of coronavirus spread on stock markets: the case of the worst 6 countries*. https://doi.org/10.2139/ssrn.3578080
4. Arafa, A., & Alber, N. (2020). The impact of coronavirus pandemic on stock market return: The case of the MENA region. *International Journal of Economics and Finance, 12*(12), 100–106 https://doi.org/10.5539/ijef.v12n12p100
5. Awad, M. H. (2020). المحاسبية للدراسات العلمية المجلة [The impact of COVID-19 pandemic outbreak on the Egyptian firms' stock returns: Evidence from emerging countries]. *Scientific Journal of Accounting Studies, 2*(4), 691–719. https://doi.org/10.21608/sjar.2020.183352
6. Barakat, M., Elgazzar, S., & Hanafy, K. (2016). Impact of macroeconomic variables on stock markets: Evidence from emerging markets. *International Journal of Economics and Finance, 8*(1), 195–207 https://doi.org/10.5539/ijef.v8n1p195
7. Cepoi, C.-O. (2020). Asymmetric dependence between stock market returns and news during COVID-19 financial turmoil. *Finance Research Letters, 36*, 101658. https://doi.org/10.1016/j.frl.2020.101658
8. Corbet, S., Hou, Y., Hu, Y., Lucey, B., & Oxley, L. (2021). Aye Corona! The contagion effects of being named Corona during the COVID-19 pandemic. *Finance Research Letters, 38*, 101591. https://doi.org/10.1016/j.frl.2020.101591
9. Elsayed, A., & Abdelrhim, M. (2020, May 23). *The effect Of COVID-19 spread on Egyptian stock market sectors*. https://doi.org/10.2139/ssrn.3608734
10. Haroon, O., & Rizvi, S. A. R. (2020). Covid-19: Media coverage and financial markets behavior — A sectorial inquiry. *Journal of Behavioral and Experimental Finance, 27*, 100343. https://doi.org/10.1016/j.jbef.2020.100343
11. He, P., Sun, Y., Zhang, Y., & Li, T. (2020). COVID-19's impact on stock prices across different Sectors — An event study based on the Chinese stock market. *Emerging Markets Finance and Trade, 56*(10), 2198–2212. https://doi.org/10.1080/1540496X.2020.1785865

12. International Monetary Fund (IMF). (2020). *World economic outlook, October 2020: A long and difficult ascent*. Retrieved from https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020
13. Khatatbeh, I. N., Hani, M. B., & Abu-Alfoul, M. N. (2020). The impact of COVID-19 pandemic on global stock markets: An event study. *International Journal of Economics and Business Administration, 8*(4), 505–514. https://doi.org/10.35808/ijeba/602
14. Mehmood, W., Mohd-Rashid, R., Aman-Ullah, A., & Tajuddin, A. H. (2021). The reaction of the Malaysian stock market to the COVID-19 pandemic. *Journal of Contemporary Eastern Asia, 20*(2), 63–84. https://doi.org/10.17477/jcea.2021.20.2.063
15. Philippe, C., & Marques, N. (2021). *The Zero Covid strategy continues to protect people, economies and freedoms more effectively*. Institut économique Molinari. Retrieved from https://www.institutmolinari.org/wp-content/uploads/2021/09/zero-covid-whn-sept2021.pdf
16. Raifu, I. A., Kumeka, T. T., & Aminu, A. (2021). Reaction of stock market returns to COVID-19 pandemic and lockdown policy: Evidence from Nigerian firm's stock returns. *Future Business Journal, 7*(1), 35. https://doi.org/10.1186/s43093-021-00080-x
17. Sathyanarayana, S., & Gargesa, S. (2018). An analytical study of the effect of inflation on stock market returns. *IRA-International Journal of Management & Social Sciences, 13*(2) 48-64. https://doi.org/10.21013/jmss.v13.n2.p3
18. Wang, Z., Zhang, Z., Zhang, Q., Gao, J., & Lin, W. (2021). COVID-19 and financial market response in China: Micro evidence and mechanisms. *PLoS ONE, 16*(9), e0256879. https://doi.org/10.1371/journal.pone.0256879
19. World Health Organization (WHO). (2022). *Weekly epidemiological update on COVID-19 — 5 April 2022*. Retrieved from https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19---5-april-2022

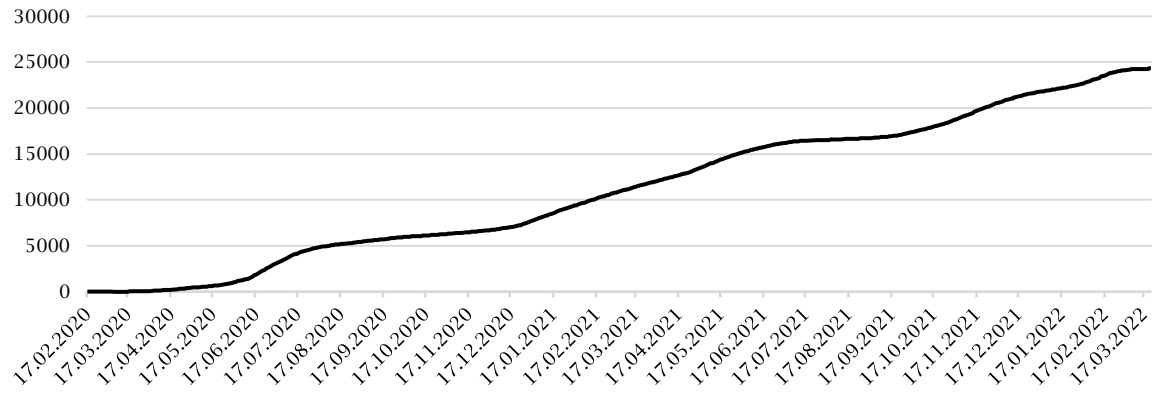
APPENDIX

Figure A.1. The impact of COVID-19 on the Egyptian stock exchange (EGX100)



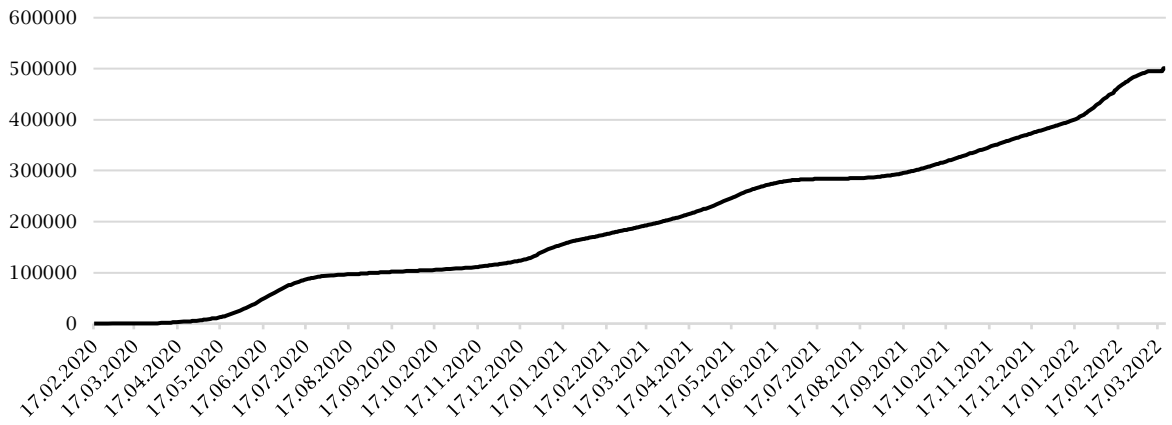
Source: https://www.investing.com/indices/egx-100-ewi

Figure A.2. COVID-19 total deaths



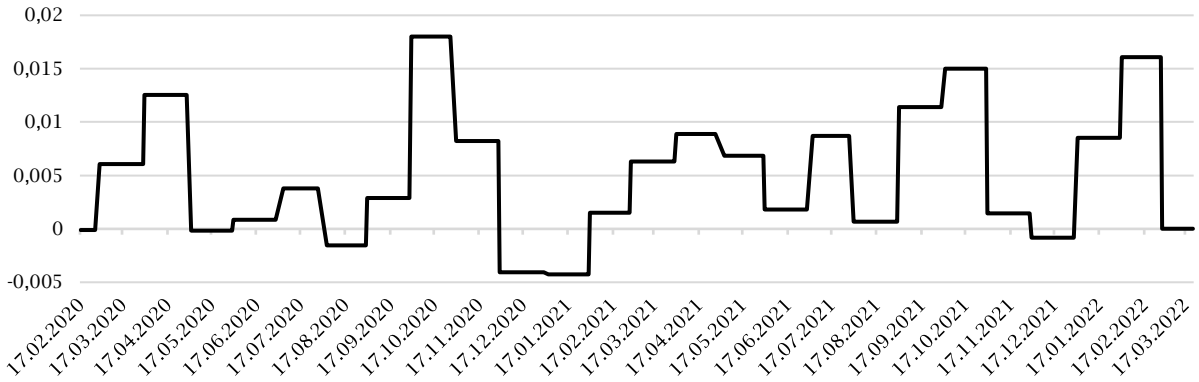
Source: Authors' elaboration.

Figure A.3. COVID-19 total cases



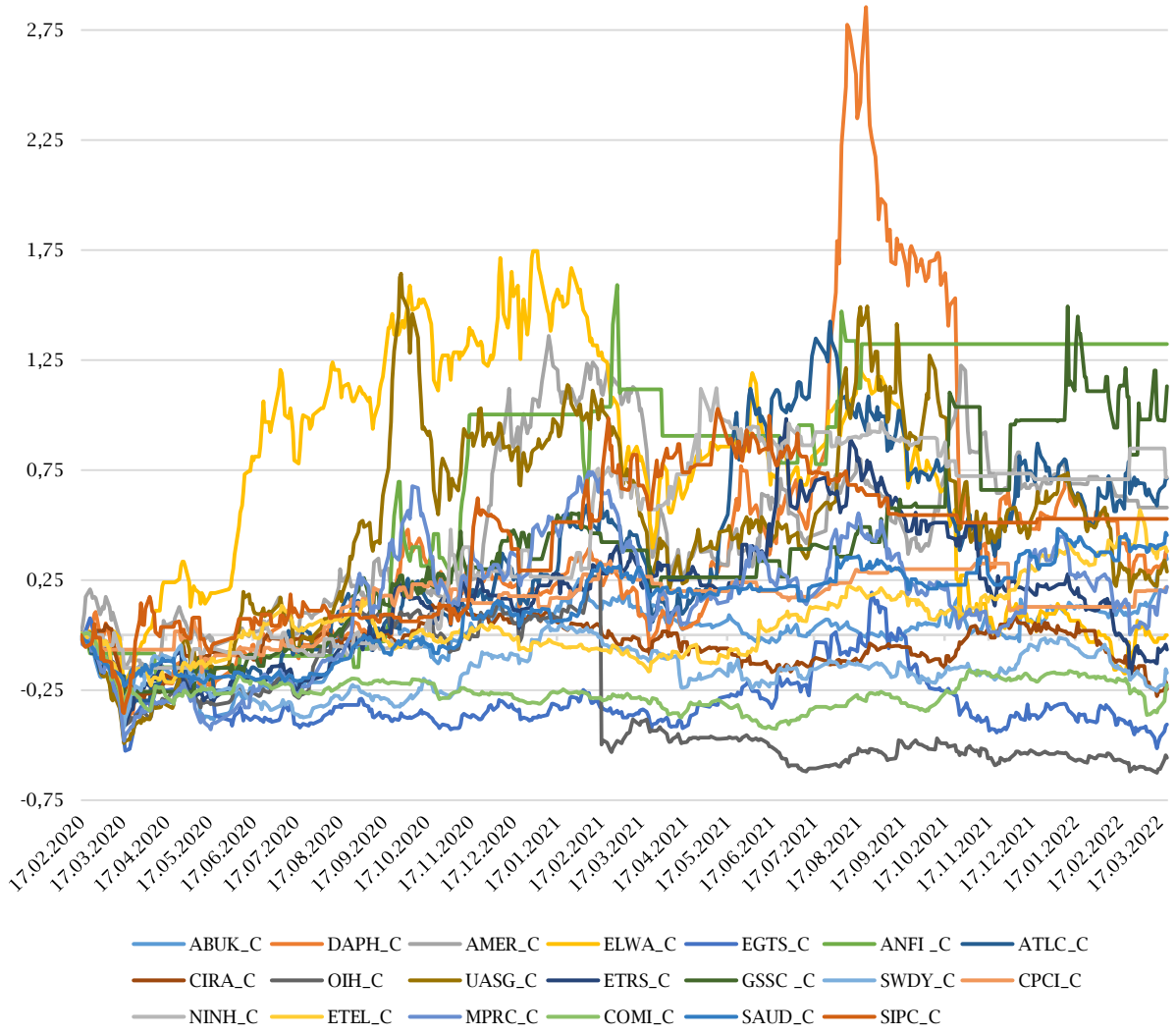
Source: Authors' elaboration.

Figure A.4. Inflation (headline CPI)



Source: Authors' elaboration.

Figure A.5. Cumulative stock returns



Source: Authors' elaboration.