Examining the Impact of COVID-19 Panic Index on Cryptocurrencies and Stock Market Indices: A Comparative Study of Egypt and USA

Prepared by

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Abstract:

Similar to (Cervantes et al., 2022), this paper examines the relationship between the stock markets of emerging and developed economies, cryptocurrencies, and the fear triggered by the COVID -19 pandemic crisis from January 2020 to May 2021. The potential relations are analysed in terms of causal models.

The study assumes that the COVID-19 panic index, VIX index, WTI index, gold index, COVID-19 confirmed cases, death cases, and fatality ratio are the independent variables, while the dependent variables are the stock returns for the two indices (EGX30 and S&P500), the returns for the five cryptocurrencies (Bitcoin, Ethereum, Litecoin, Ripple, and Tether), the market risk.

Overall, our Structural Equation Model analysis results suggest that changes in panic indices resulting from the COVID-19 pandemic have a significant positive relationship with daily S&P500 stock risk, daily Bitcoin risk, daily Litcoin risk, and daily Ripple risk. Furthermore, there is a significant positive relationship between the daily WTI Oil index returns and daily EGX30 stock returns. Our results show a significant positive relationship between daily VIX volatility index returns and daily Tether returns.

Key Words: Panic Indexes, COVID-19, Emerging and Developed Markets, Commodity Markets, Cryptocurrencies, and Causal Models.

JEL Classification: G11, G15, G23, G41

1. Introduction:

This study aims to shed light on the relationship between investor fear, and stock market returns during a COVID-19 crisis. Our sample period extends from January 2020, when the World Health Organization (WHO) made public the fact that limited human-to-human transmission of COVID-19 may have occurred, to May 2021 (Cervantes et al., 2022).

Global financial markets have faced tremendous uncertainty during the latest COVID-19 outbreak. Stock markets in the US, for example, have hit four circuit breakers in two weeks (Al-Awadhi et al., 2020; Ahmar and Del Val, 2020). Crude oil prices have fallen to less than $20 per barrel, a low record since the beginning of the new century. Zhang et al. (2020) argue that the instability and uncertainty caused by the pandemic led the financial market to be highly unpredictable and volatile (Jeribi and Manzli, 2021;Al-Awadhi et al. (2020) also finds that daily increase in both the total number of cases and deaths have a negative impact on the stock market return. Based on the study of Baur and Lucey (2010), we test the impact of the COVID-19 global pandemic by addressing these two specific questions:

1- How COVID-19 Panic Index impact Egyptian stock market, US stock market, and the five cryptocurrencies (Bitcoin, Ethereum, Litecoin, Tether, and Ripple)?

2- How VIX, Oil, and Gold prices, as well as the number of COVID-19 cases and deaths, impact the Egyptian stock market and US stock market, and the five cryptocurrencies (Bitcoin, Ethereum, Litecoin, Tether, and Ripple)?

The remainder of this paper is organized as follows. Section 2 covers the literature review, Section 3 discusses data and methods, Section 4 presents the results, and Section 5 concludes the paper.

2. Literature Review

2.1. The Impact of Panic Index on Stock Market Indices

A growing literature investigates various aspects of how COVID-19-related news affects investors fear during the pandemic (Cepoi, 2020; Haroon and Rizvi, 2020a; Lee, 2020; Baig et al., 2021; Yu et al., 2022). Covid 19 evolution has been uneven among countries, but there is a big differences between developed and emerging countries In developed countries, the rates of confirmed cases follow a somewhat similar pattern (Lee et al., 2002; Baker and Wurgler, 2007; Tetlock, 2007; Beer et al., 2011; Reboredo etal., 2013; Kearney and Liu, 2014; Renault, 2017, Baker and Wurgler, 2007). Our study investigates the impact of pandemic fear on investor sentiment and stock market behavior in both developed and emerging countries. Therefore, we examine the stock market returns of US as developed economy and those of Egypt as emerging economy.

2.2. The Impact of COVID-19 on Commodity Market

The global outbreak of COVID-19 continues to negatively impact the international economic activities and financial stability in both stock markets and commodity markets (Umar et al., 2021; Aslam et al., 2020; Corbet et al., 2020a; Umar and Gubareva, 2020). This uncertainty caused by COVID-19 pandemic makes investors and portfolio managers want to decrease the

potential risk through searching for safe-haven assets like commodities to include in their portfolios (Choudhry et al., 2015; Troster et al., 2019; Umar et al., 2021). In this paper we show how the COVID-19 crisis has affected commodity market returns like WTI (Oil Index), Gold Index, and VIX (Volatility Index).

2.3. The Impact of Panic Index on Cryptocurrencies

COVID-19 is the first major crisis since the inception of the cryptocurrency which happened soon following the finical crisis in 2008 (Nakamoto, 2008). Despite their advantages over traditional assets, cryptocurrencies were much more volatile than other traditional assets (Marobhe and Pastory, 2020, Curto and Serrasqueiro, 2021; Marobhe, 2022).

This study adds to existing knowledge on two folds. First, the study examines the impact of Covid 19 panic index (CPI) created by RavenPack as an exogenous variable on cryptocurrency and stock market returns (Ravenpack, 2020). Since cryptocurrencies are different from stocks, the study compares the impact of COVID-19 panic on cryptocurrencies with those from two major emerging and developed stock indices (EGX30 and S&P 500) (Bouri et al., 2021). Second, the study makes use of Structural Equation Model Analysis, and robust regression for additional robustness checks to model how COVID-19 panic impact cryptocurrencies and stock indices (Kristoufek, 2020, Demir et al., 2020; Yousaf et al., 2023; Shahzad et al., 2021; Naeem et al., 2021, Ozkan, 2021; Curto and Serrasqueiro, 2021; Nguyen et al., 2021; Chen et al., 2021).

2.4. Research Hypothesis

This paper expands the existing literature by exploring the impact of COVID-19 Panic Index on Stock Market Indices, and Cryptocurrencies. The objective aim of this study is to examine the impact of panic index on the ability of Stock Market Indices and Cryptocurrencies to fulfill excess returns using system-based model (SEM).

1- There is a significant positive relationship between daily WTI oil index returns and daily EGX30 stock returns.

2- There is a significant negative relationship between daily MEDIA_HYPE_ index and daily EGX30 stock return.

3- There is a significant negative relationship between daily VIX volatility index returns and daily S&P500 stock returns.

4- There is a significant positive relationship between daily PANIC index and daily S&P500 stock risk.

5- There is a significant negative relationship between daily VIX volatility index returns and daily Bitcoin returns.

6- There is a significant positive relationship between daily PANIC index and daily Bitcoin, Litcoin, and Ripple risk.

7- There is a significant positive relationship between daily VIX volatility index returns and daily Tether returns.

8- There is a significant positive relationship between daily PANIC index and daily EGX30 stock risk.

3. Data and Methods

3.1 Data

The data in this study was used to measure fear in different emerging and developed countries markets due to Covid 19 pandemic. Data was extracted on a daily basis starting from January, 2020, the first date for which pandemic anxiety indexes were available, and ending on May 2021. Regarding the fear in the market, and following several recent studies on the pandemic (Baig et al., 2021; Cepoi, 2020; Haroon and Rizvi, 2020a; Tan, 2021; Umar and Gubareva, 2020; Umar et al., 2021), we examine the relationship between stock market returns of EGX30 ,S&P500, and Cryptocurrencies and the fear created by COVID-19. Therefore, RavenPack' Infodemic, Panic, Media Hype, Media Coverage, Fake News, and Sentiment indexes were used for each country as proxies for pandemic panic. The data was obtained from the RavenPack. (See, Table 1).

Table 1: Description of RavenPack Indexes

Source: Raven Pack

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Infodemic Index (II)	Calculates the percentage of entities that are reported alongside the coronavirus in the media. The index can take values between 0 and 100, where a value of 50 means that 50 percent of the entities mentioned in the media is being linked to COVID-19.
Media Coverage Index (MCI)	Measures the daily level of all news sources covering the topic of COVID-19. The value of the index can fluctuate from a minimum of 0 and a maximum of 100. The higher the index, the more news sources are talking about the pandemic

Media Hype Index (MHI)	Quantifies the daily level of news mentioning COVID-19. Index values range from 0 to 100. A value of 100 means that 100 percent of the news mentions COVID-19 on that day.
Panic Index (PI)	The Coronavirus Panic Index measures the level of news chatter that makes reference to panic or hysteria alongside the Coronavirus. Values range between 0 and 100 where a value of 7.00 indicates that 7 percent of all news globally is talking about panic related terms and COVID-19.
Fake News Index (FNI)	The Coronavirus Fake News Index measures the level of media chatter about the novel virus that makes reference to misinformation or fake news alongside COVID-19. Values range between 0 and 100 where a value of 2.00 indicates that 2 percent of all news globally is talking about fake news and COVID-19.
Global Sentiment (GS)	The Coronavirus Sentiment Index measures the level of sentiment across all entities mentioned in the news alongside the Coronavirus. The index ranges between -100 and 100 where a value of 100 is the most positive sentiment, -100 is the most negative, and 0 is neutral.

Furthermore, the Volatility Index (VIX), which is a real-time index that reflects market expectations of short-term price changes in the S&P 500 Index (SPX), is also included because it has been considered an indicator of market fear in other studies (Umar et al., 2021). Our data consists of daily observations on closing prices. The cryptocurrencies prices (Bitcoin, Ethereum, Litecoin, Tether, and Ripple), and (Gold, WTI, and VIX) prices was obtained from the Yahoo Finance.

3.2. Endogenous and Exogenous Variables Measurements

This study uses different endogenous variables, and exogenous variables, which might influence the returns (Huber and Mellace, 2013). The

endogenous variables in this study are EGX30 index daily returns, S&P 500 index daily returns, and daily returns of five cryptocurrencies (Bitcoin, Ethereum, Litecoin, Tether, and Ripple). The empirical analysis is carried out using Market Risk which is calculated using standard deviations of daily returns. The study variables are as follows: 1) the dependent variables are the cryptocurrency daily returns, EGX30 index daily returns, and S&P 500 index daily returns; 2) the independent variables are Gold, WTI, and VIX prices, Panic Index, COVID-19 confirmed cases, and COVID-19 death cases.

4. Empirical Evidence

To test the effect of Panic Index on Stock Market Indices and Cryptocurrencies, this paper utilizes SEM technique to deal with the endogeniety problem between Panic Index and Performance through the following three stages: model specification, model estimation, and goodness of fit indices (Hair et al., 2006). In this paper we investigate the interrelationships between Stock Market Indices, and Cryptocurrencies simultaneously.

To check the robustness of the findings, we use robust statistical techniques:

• SEM + panel data: a recursive structural equation model has causation which flows in one direction.

4.1 Structural Model Specification

Considering the potential endogeneity problem between Panic Index and Stock Market Indices and Cryptocurrencies and similar to (Erkens et al., 2012) the central research question focuses on whether or not Panic Index - Stock

Market Indices and Cryptocurrencies is moderated by the structure of Market Risk by using the following structural equation model.

Since there are three different measures of returns (EGX30, S&P500, and Cryptocurrencies), we end up with three estimates. The model using EGX30 (daily returns), S&P500 (daily returns), and Cryptocurrencies (Bitcoin, Ethereum, Litecoin, Tether, and Ripple) are respectively named as Model 1, Model 2 and Model 3. We illustrate the path diagram of the three endogenous variables in Figure 1.

Model (A):

The first equation of the SEM can be modeled by the following specification:

$$
\begin{aligned}
\boldsymbol{Return_{EGX30}} = {}& \alpha_{it} + \alpha_1\left(\boldsymbol{Risk_{EGX30}}\right) + \alpha_2\left(Cumulative\_cases_{Egypt}\right) \\
& + \alpha_3\left(New\_cases_{Egypt}\right) + \alpha_4\left(New\_deaths_{Egypt}\right) \\
& + \alpha_5\left(Fatility\ Ratio_{Egypt}\right) + \alpha_6\left(Return_{VIXindex}\right) \\
& + \alpha_7\left(Return_{WTIOilindex}\right) + \alpha_8\left(Return_{Goldindex}\right) \\
& + \alpha_9\left(PANIC\_INDEX_{EG}\right) + \alpha_{10}\left(MEDIA\_HYPE\_INDEX_{EG}\right) \\
& + \alpha_{11}\left(SENTIMENT\_INDEX_{EG}\right) \\
& + \alpha_{12}\left(INFODEMIC\_INDEX_{EG}\right) \\
& + \alpha_{13}\left(MEDIA\_COVERAGE\_INDEX_{EG}\right) \\
& + \alpha_{14}\left(FAKE\_NEWS\_INDEX_{EG}\right) + \varepsilon_1
\end{aligned}
$$

Next, the determination of the Risk is also endogenized using the following specification:

$$Risk_{EGX30} = \beta_{it} + \beta_1 \left(Cumulative\_cases_{Egypt}\right) + \beta_2 \left(New\_cases_{Egypt}\right)$$
$$+ \beta_3 \left(New\_deaths_{Egypt}\right)$$
$$+ \beta_4 \left(Fatility\ Ratio_{Egypt}\right) + \beta_5 \left(Return_{VIXindex}\right)$$
$$+ \beta_6 \left(Return_{WTIOilindex}\right) + \beta_7 \left(Return_{Goldindex}\right)$$
$$+ \beta_8 \left(PANIC\_INDEX_{EG}\right) + \beta_9 \left(MEDIA\_HYPE\_INDEX_{EG}\right)$$
$$+ \beta_{10} \left(SENTIMENT\_INDEX_{EG}\right)$$
$$+ \beta_{11} \left(INFODEMIC\_INDEX_{EG}\right)$$
$$+ \beta_{12} \left(MEDIA\_COVERAGE\_INDEX_{EG}\right)$$
$$+ \beta_{13} \left(FAKE\_NEWS\_INDEX_{EG}\right) + \varepsilon_1$$

Model (B):

The first equation of the SEM can be modeled by the following specification:

$$Return_{S\&P500} = \alpha_{it} + \alpha_1 \left(Risk_{S\&P500}\right) + \alpha_2 \left(New\_deaths_{US}\right)$$
$$+ \alpha_3 \left(Fatility\ Ratio_{US}\right) + \alpha_4 \left(Return_{VIXindex}\right)$$
$$+ \alpha_5 \left(Return_{WTIOilindex}\right) + \alpha_6 \left(Return_{Goldindex}\right)$$
$$+ \alpha_7 \left(PANIC\_INDEX_{US}\right) + \alpha_8 \left(MEDIA\_HYPE\_INDEX_{US}\right)$$
$$+ \alpha_9 \left(SENTIMENT\_INDEX_{US}\right)$$
$$+ \alpha_{10} \left(INFODEMIC\_INDEX_{US}\right)$$
$$+ \alpha_{11} \left(MEDIA\_COVERAGE\_INDEX_{US}\right)$$
$$+ \alpha_{12} \left(FAKE\_NEWS\_INDEX_{US}\right) + \varepsilon_1$$

Next, the determination of the Risk is also endogenized using the following specification:

$$
\begin{aligned}
Risk_{S\&P500} = {} & \beta_{it} + \beta_1 \left(Cumulative\_cases_{US}\right) + \beta_2 \left(New\_cases_{US}\right) \\
& + \beta_3 \left(New\_deaths_{US}\right) \\
& + \beta_4 \left(Fatility\ Ratio_{US}\right) + \beta_5 \left(Return_{VIXindex}\right) \\
& + \beta_6 \left(Return_{WTIOilindex}\right) + \beta_7 \left(Return_{Goldindex}\right) \\
& + \beta_8 \left(PANIC\_INDEX_{US}\right) + \beta_9 \left(MEDIA\_HYPE\_INDEX_{US}\right) \\
& + \beta_{10} \left(SENTIMENT\_INDEX_{US}\right) \\
& + \beta_{11} \left(INFODEMIC\_INDEX_{US}\right) \\
& + \beta_{12} \left(MEDIA\_COVERAGE\_INDEX_{US}\right) \\
& + \beta_{13} \left(FAKE\_NEWS\_INDEX_{US}\right) + \varepsilon_1
\end{aligned}
$$

Model (C):

The first equation of the SEM can be modeled by the following specification:

$$
\begin{aligned}
Return_{Bitcoin} = {} & \alpha_{it} + \alpha_1 \left(Risk_{Bitcoin}\right) + \alpha_2 \left(WorldNew_{deaths}\right) \\
& + \alpha_3 \left(Return_{VIXindex}\right) \\
& + \alpha_4 \left(Return_{WTIOilindex}\right) + \alpha_5 \left(Return_{Goldindex}\right) \\
& + \alpha_6 \left(PANIC\_INDEX_{WW}\right) + \alpha_7 \left(MEDIA\_HYPE\_INDEX_{WW}\right) \\
& + \alpha_8 \left(SENTIMENT\_INDEX_{WW}\right) \\
& + \alpha_9 \left(INFODEMIC\_INDEX_{WW}\right) \\
& + \alpha_{10} \left(MEDIA\_COVERAGE\_INDEX_{WW}\right) \\
& + \alpha_{11} \left(FAKE\_NEWS\_INDEX_{WW}\right) + \varepsilon_1
\end{aligned}
$$

$$Return_{Ethereum} = \alpha_{it} + \alpha_1 (\boldsymbol{Risk_{Ethereum}}) + \alpha_2 (WorldNew_{deaths})$$
$$+ \alpha_3 (Return_{VIXindex})$$
$$+ \alpha_4 (Return_{WTIOilindex}) + \alpha_5 (Return_{Goldindex})$$
$$+ \alpha_6 (PANIC\_INDEX_{WW}) + \alpha_7 (MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \alpha_8 (SENTIMENT\_INDEX_{WW})$$
$$+ \alpha_9 (INFODEMIC\_INDEX_{WW})$$
$$+ \alpha_{10} (MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \alpha_{11} (FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

$$Return_{Litecoin} = \alpha_{it} + \alpha_1 (\boldsymbol{Risk_{Litecoin}}) + \alpha_2 (WorldNew_{deaths})$$
$$+ \alpha_3 (Return_{VIXindex})$$
$$+ \alpha_4 (Return_{WTIOilindex}) + \alpha_5 (Return_{Goldindex})$$
$$+ \alpha_6 (PANIC\_INDEX_{WW}) + \alpha_7 (MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \alpha_8 (SENTIMENT\_INDEX_{WW})$$
$$+ \alpha_9 (INFODEMIC\_INDEX_{WW})$$
$$+ \alpha_{10} (MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \alpha_{11} (FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

$$Return_{Ripple} = \alpha_{it} + \alpha_1 (\boldsymbol{Risk_{Ripple}}) + \alpha_2 (WorldNew_{deaths})$$
$$+ \alpha_3 (Return_{VIXindex})$$
$$+ \alpha_4 (Return_{WTIOilindex}) + \alpha_5 (Return_{Goldindex})$$
$$+ \alpha_6 (PANIC\_INDEX_{WW}) + \alpha_7 (MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \alpha_8 (SENTIMENT\_INDEX_{WW})$$
$$+ \alpha_9 (INFODEMIC\_INDEX_{WW})$$
$$+ \alpha_{10} (MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \alpha_{11} (FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

$$Return_{Tether} = \alpha_{it} + \alpha_1 (\boldsymbol{Risk_{Tether}}) + \alpha_2 (WorldNew_{deaths})$$
$$+ \alpha_3 (Return_{VIXindex})$$
$$+ \alpha_4 (Return_{WTIOilindex}) + \alpha_5 (Return_{Goldindex})$$
$$+ \alpha_6 (PANIC\_INDEX_{WW}) + \alpha_7 (MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \alpha_8 (SENTIMENT\_INDEX_{WW})$$
$$+ \alpha_9 (INFODEMIC\_INDEX_{WW})$$
$$+ \alpha_{10} (MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \alpha_{11} (FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

Next, the determination of the Risk is also endogenized using the following specification:

$$Risk_{Bitcoin} = \beta_{it} + \beta_1 (WorldNew_{deaths}) + \beta_2 (Return_{VIXindex})$$
$$+ \beta_3 (Return_{WTIOilindex}) + \beta_4 (Return_{Goldindex})$$
$$+ \beta_5 (PANIC\_INDEX_{WW}) + \beta_6 (MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \beta_7 (SENTIMENT\_INDEX_{WW})$$
$$+ \beta_8 (INFODEMIC\_INDEX_{WW})$$
$$+ \beta_9 (MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \beta_{10} (FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

$$Risk_{Ethereum} = \beta_{it} + \beta_1 (WorldNew_{deaths}) + \beta_2 (Return_{VIXindex})$$
$$+ \beta_3 (Return_{WTIOilindex}) + \beta_4 (Return_{Goldindex})$$
$$+ \beta_5 (PANIC\_INDEX_{WW}) + \beta_6 (MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \beta_7 (SENTIMENT\_INDEX_{WW})$$
$$+ \beta_8 (INFODEMIC\_INDEX_{WW})$$
$$+ \beta_9 (MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \beta_{10} (FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

$$Risk_{Litecoin} = \beta_{it} + \beta_1\,(WorldNew_{deaths}) + \beta_2\,(Return_{VIXindex})$$
$$+ \beta_3\,(Return_{WTIOilindex}) + \beta_4\,(Return_{Goldindex})$$
$$+ \beta_5\,(PANIC\_INDEX_{WW}) + \beta_6\,(MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \beta_7\,(SENTIMENT\_INDEX_{WW})$$
$$+ \beta_8\,(INFODEMIC\_INDEX_{WW})$$
$$+ \beta_9\,(MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \beta_{10}\,(FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

$$Risk_{Ripple} = \beta_{it} + \beta_1\,(WorldNew_{deaths}) + \beta_2\,(Return_{VIXindex})$$
$$+ \beta_3\,(Return_{WTIOilindex}) + \beta_4\,(Return_{Goldindex})$$
$$+ \beta_5\,(PANIC\_INDEX_{WW}) + \beta_6\,(MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \beta_7\,(SENTIMENT\_INDEX_{WW})$$
$$+ \beta_8\,(INFODEMIC\_INDEX_{WW})$$
$$+ \beta_9\,(MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \beta_{10}\,(FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

$$Risk_{Tether} = \beta_{it} + \beta_1\,(WorldNew_{deaths}) + \beta_2\,(Return_{VIXindex})$$
$$+ \beta_3\,(Return_{WTIOilindex}) + \beta_4\,(Return_{Goldindex})$$
$$+ \beta_5\,(PANIC\_INDEX_{WW}) + \beta_6\,(MEDIA\_HYPE\_INDEX_{WW})$$
$$+ \beta_7\,(SENTIMENT\_INDEX_{WW})$$
$$+ \beta_8\,(INFODEMIC\_INDEX_{WW})$$
$$+ \beta_9\,(MEDIA\_COVERAGE\_INDEX_{WW})$$
$$+ \beta_{10}\,(FAKE\_NEWS\_INDEX_{WW}) + \varepsilon_1$$

Figure 1: Path Diagram of the Structural Equation Model
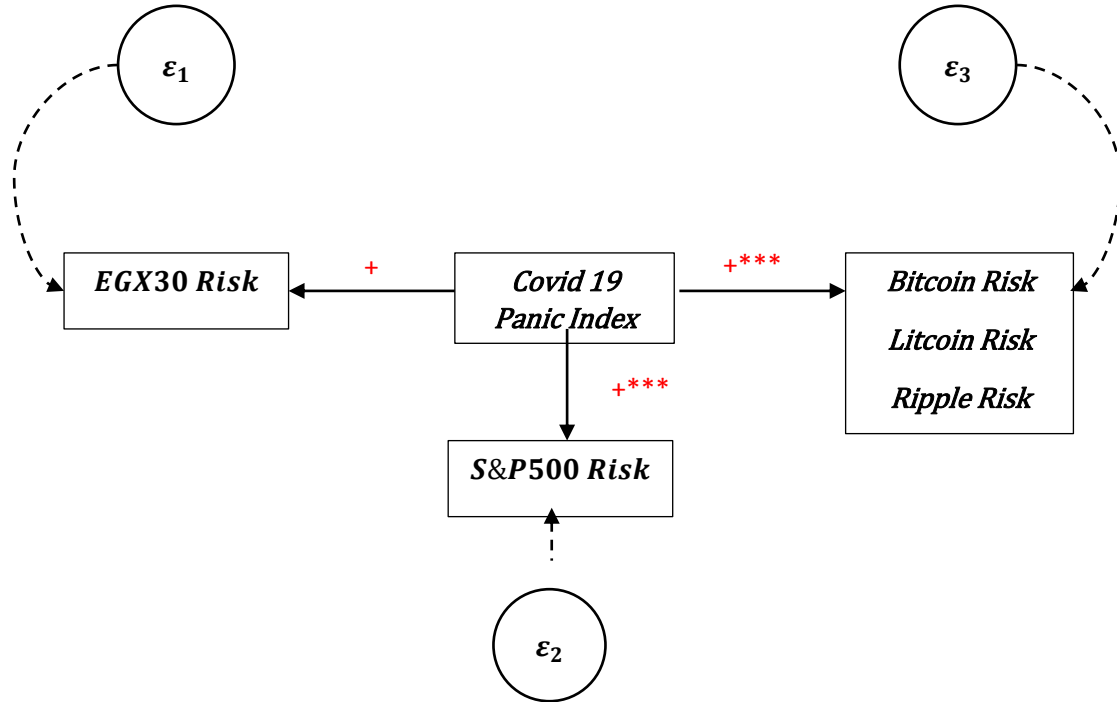
4.2 The Estimation Results

The results about the estimation of the structural model (A), (B), and (C) are presented in Table 2.

Table 2: Estimated Path Coefficients of the SEMs

EGX30	Model A	
ReturnEGX30	**1**	**2**
RiskEGX30	0.2261381	0.032
ReturnVIXindex	0.0037403	0.552
ReturnWTIOilindex	0.048031	0.001
ReturnGold	0.1070698	0.092
PANIC_INDEXEG	0.0001825	0.336
MEDIA_HYPE_INDEXEG	-0.0003498	0.000
SENTIMENT_INDEXEG	0.000198	0.034
New_casesEgypt	-0.0000121	0.003
Cumulative_casesEgypt	-6.17E-08	0.000

New_deathsEgypt	0.0003589	0.000
FatalityRatioEgypt	-3.109042	0.000
INFODEMIC_INDEXEG	0.000161	0.048
MEDIA_COVERAGE_INDEXEG	0.0003877	0.000
FAKE_NEWS_INDEXEG	-0.0012082	0.026
Constant	-0.0101965	0.019
RiskEGX30	**1**	**2**
ReturnVIXindex	-0.0012326	-0.794
ReturnWTIOilindex	0.0395163	0.000
ReturnGold	0.0345761	0.468
PANIC_INDEXEG	0.0000811	0.569
MEDIA_HYPE_INDEXEG	5.04E-07	0.995
SENTIMENT_INDEXEG	-0.0000767	0.271
New_casesEgypt	2.23E-06	0.458
Cumulative_casesEgypt	-5.36E-09	0.667
New_deathsEgypt	-0.0000716	0.296
FatalityRatioEgypt	1.285532	0.002
INFODEMIC_INDEXEG	-0.0000799	0.189
MEDIA_COVERAGE_INDEXEG	0.0000784	0.295
FAKE_NEWS_INDEXEG	0.0000373	0.927
Constant	0.0074493	0.020
S&P500	**Model B**	
ReturnS&P500	**1**	**2**
RiskSP500	0.1613087	0.069
ReturnVIXindex	-0.1263838	0.000
ReturnGold	0.1319832	0.091
ReturnWTIOilindex	0.0059794	0.129
PANIC_INDEXUS	-0.0024681	0.197
MEDIA_HYPE_INDEXUS	0.0003976	0.216
FAKE_NEWS_INDEXUS	-0.0005281	0.895
SENTIMENT_INDEXUS	0.0001892	0.027
INFODEMIC_INDEXUS	-0.0005356	0.183
MEDIA_COVERAGE_INDEXUS	0.0002394	0.322
FatalityRatioUS	0.5557005	0.272
New_deathsUS	2.15E-06	0.043
Constnt	0.000925	0.833

RiskS&P500	1	2
ReturnVIXindex	0.0185443	0.011
ReturnGold	-0.2529219	0.000
ReturnWTIOilindex	0.0058863	0.067
PANIC_INDEXUS	0.0073162	0.000
MEDIA_HYPE_INDEXUS	0.0003785	0.230
FAKE_NEWS_INDEXUS	-0.0051113	0.117
SENTIMENT_INDEXUS	0.0000708	0.327
INFODEMIC_INDEXUS	-0.0004671	0.158
MEDIA_COVERAGE_INDEXUS	-0.0000303	0.884
New_casesUS	1.95E-09	0.919
Cumulative_casesUS	1.30E-10	0.186
FatalityRatioUS	2.29623	0.000
New_deathsUS	-2.38E-06	0.036
Constnt	0.0070143	0.061
Cryptocurrencies	Model C	
ReturnBitcoin	1	2
RiskBitcoin	-0.05585	0.468
ReturnVIXindex	-0.14475	0.000
ReturnWTIOilindex	0.014403	0.296
ReturnGold	0.502421	0.028
PANIC_INDEXWW	0.001985	0.784
MEDIA_HYPE_INDEXWW	-7.9E-05	0.947
FAKE_NEWS_INDEXWW	0.025344	0.085
SENTIMENT_INDEXWW	-7.6E-05	0.678
INFODEMIC_INDEXWW	0.000511	0.711
MEDIA_COVERAGE_INDEXWW	-0.00094	0.282
WorldNew_deaths	8.19E-07	0.359
Constsnt	0.019409	0.192
RiskBitcoin	1	2
ReturnVIXindex	0.019827	0.338
ReturnWTIOilindex	0.017903	0.110
ReturnGold	-0.60888	0.001
PANIC_INDEXWW	0.020473	0.000
MEDIA_HYPE_INDEXWW	-0.00078	0.419
FAKE_NEWS_INDEXWW	-0.01485	0.215

SENTIMENT_INDEXWW	-8.6E-05	0.564
INFODEMIC_INDEXWW	-0.00035	0.755
MEDIA_COVERAGE_INDEXWW	-0.0002	0.777
WorldNew_deaths	2.25E-06	0.002
Constsnt	0.030226	0.012
ReturnEthereum	**1**	**2**
RiskEthereum	-0.0770376	0.307
ReturnVIXindex	-0.184677	0.000
ReturnGold	0.5062517	0.086
ReturnWTIOilindex	0.0058916	0.744
MEDIA_HYPE_INDEXWW	-7.68E-06	0.996
FAKE_NEWS_INDEXWW	0.0264166	0.168
PANIC_INDEXWW	0.0008856	0.924
WorldNew_deaths	6.56E-07	0.572
SENTIMENT_INDEXWW	-0.0000525	0.825
INFODEMIC_INDEXWW	0.0000231	0.990
MEDIA_COVERAGE_INDEXWW	-0.000672	0.555
Constant	0.0300671	0.121
RiskEthereum	**1**	**2**
ReturnVIXindex	0.028109	0.308
ReturnGold	-0.5693258	0.019
ReturnWTIOilindex	0.0296165	0.047
MEDIA_HYPE_INDEXWW	0.0003463	0.788
FAKE_NEWS_INDEXWW	-0.0213712	0.180
PANIC_INDEXWW	0.0185993	0.016
WorldNew_deaths	2.74E-06	0.004
SENTIMENT_INDEXWW	-0.0000937	0.636
INFODEMIC_INDEXWW	-0.0025363	0.090
MEDIA_COVERAGE_INDEXWW	0.000923	0.330
Constant	0.0399787	0.012
ReurnLitecoin	**1**	**2**
RiskLitecoin	-0.01347	0.865
ReturnVIXindex	-0.1796	0.000
ReturnWTIOilindex	0.009945	0.602
ReturnGold	0.674285	0.032
PANIC_INDEXWW	0.003212	0.750

MEDIA_HYPE_INDEXWW	-0.00016	0.922
FAKE_NEWS_INDEXWW	0.022766	0.267
WorldNew_deaths	9.72E-07	0.437
SENTIMENT_INDEXWW	3.99E-05	0.875
INFODEMIC_INDEXWW	0.000348	0.856
MEDIA_COVERAGE_INDEXWW	-0.00108	0.370
Constant	0.037991	0.068
RiskLitecoin	**1**	**2**
ReturnVIXindex	0.013043	0.641
ReturnWTIOilindex	0.009429	0.533
ReturnGold	-0.54072	0.028
PANIC_INDEXWW	0.028575	0.000
MEDIA_HYPE_INDEXWW	-0.00139	0.288
FAKE_NEWS_INDEXWW	-0.03261	0.044
WorldNew_deaths	3.80E-06	0.000
SENTIMENT_INDEXWW	-0.00013	0.506
INFODEMIC_INDEXWW	-0.00084	0.579
MEDIA_COVERAGE_INDEXWW	-7.3E-05	0.940
Constant	0.053565	0.001
ReturnRipple	**1**	**2**
RiskRipple	0.1177177	0.155
ReturnVIXindex	-0.1572735	0.000
ReturnWTIOilindex	0.0069741	0.758
ReturnGold	0.5519222	0.138
PANIC_INDEXWW	-0.0088972	0.462
MEDIA_HYPE_INDEXWW	0.0010534	0.594
FAKE_NEWS_INDEXWW	0.0237949	0.329
SENTIMENT_INDEXWW	0.0000714	0.814
INFODEMIC_INDEXWW	-0.0010041	0.659
MEDIA_COVERAGE_INDEXWW	0.0001971	0.891
WorldNew_deaths	-6.43E-07	0.679
Constant	0.0135714	0.581
RiskRipple	**1**	**2**
ReturnVIXindex	-0.0095062	0.765
ReturnWTIOilindex	0.0144839	0.399
ReturnGold	-0.493174	0.079

	1	2
PANIC_INDEXWW	0.0381805	0.000
MEDIA_HYPE_INDEXWW	-0.0031616	0.033
FAKE_NEWS_INDEXWW	-0.0348963	0.058
SENTIMENT_INDEXWW	-0.0005017	0.028
INFODEMIC_INDEXWW	0.0013027	0.450
MEDIA_COVERAGE_INDEXWW	-0.0014108	0.196
WorldNew_deaths	6.84E-06	0.000
Constant	0.0475007	0.010
ReturnTether	**1**	**2**
RiskTether	-0.07299	0.339
ReturnVIXindex	0.002068	0.001
ReturnGold	-0.00112	0.843
ReturnWTIOilindex	5.04E-05	0.882
PANIC_INDEXWW	-0.00024	0.178
MEDIA_HYPE_INDEXWW	1.58E-05	0.591
FAKE_NEWS_INDEXWW	-2.8E-05	0.938
SENTIMENT_INDEXWW	-3.77E-06	0.402
INFODEMIC_INDEXWW	-4.1E-05	0.236
MEDIA_COVERAGE_INDEXWW	3.85E-05	0.074
WorldNew_deaths	-1.55E-08	0.473
Constant	-0.00046	0.246
RiskTether	**1**	**2**
ReturnVIXindex	-6.88E-06	0.989
ReturnGold	-0.01519	0.001
ReturnWTIOilindex	0.000468	0.093
PANIC_INDEXWW	0.000221	0.124
MEDIA_HYPE_INDEXWW	4.11E-05	0.088
FAKE_NEWS_INDEXWW	-0.00031	0.292
SENTIMENT_INDEXWW	-8.66E-09	0.998
INFODEMIC_INDEXWW	-7.7E-05	0.006
MEDIA_COVERAGE_INDEXWW	1.26E-05	0.476
WorldNew_deaths	-1.42E-08	0.426
Constant	0.002105	0.000

Note: This table provides results from SEM of the effect of **COVID-19 Panic Index on Stock Market Indices and Cryptocurrencies** from January 2020

to May 2021. A robust t-statistics test is conducted. Column (2) provides p-values. Column (1) presents the path coefficients of the model (A), (B), and (C). * Statistical significance at 10% level, ** Statistical significance at 5% level, *** Statistical significance at 1% level.

According to the previous, in testing the hypotheses, results reveal that there are eight hypotheses in this study, and seven hypotheses i.e. H1, H2, H3, H4, H5, H6, H7 are statistically significant. Thus, these hypotheses are supported. While, one hypothesis i.e. H8 is found statistically not significant. Hence, this hypothesis is not supported.

Although the hypothesis is not supported, the result is consistent with (El-Basuony, 2020) who found that the COVID-19 crisis has had a negative impact on the efficiency of the Egyptian stock market.

4.3 The Goodness of Fit

The fit indices shown in Table 3 indicate that the hypothesized structural model provides a good fit to the data.

In Table 3 the (R-squared) value of EGX30 is 0. 53, the (R-squared) value of S&P500 is 0. 82, the (R-squared) value of Bitcoin is 0.31, the (R-squared) value of Ethereum is 0.27, the (R-squared) value of Litecoin is 0.28, the (R-squared) value of Ripple is 0.29, and the (R-squared) value of Tether is 0.33. Therefore, the fit indices indicate that the hypothesized structural model provides a good fit to the data.

Table 3: Structural Equation Model Goodness of Fit

Measures	Fitted	Variance Predicted	Residual	R-squared	Mc	Mc2
EGX30						
ReturnEGX30	0.0001527	0.000056	0.0000966	0.3670473	0.6058443	0.3670473
RiskEGX30	0.0000752	0.0000207	0.0000544	0.2760393	0.5253944	0.2760393
Overall				**0.5325931**		
S&P500						
Return S&P500	0.0003363	0.0001884	0.0001479	0.5601134	0.7484072	0.5601134
Risk S&P500	0.0002542	0.0001558	0.0000984	0.6130295	0.782962	0.6130295
overall				**0.8294488**		
Bitcoin						
Return Bitcoin	0.0024579	0.0004465	0.0020114	0.1816523	0.4023449	0.1816523
Risk Bitcoin	0.0015989	0.0002588	0.00134	0.1618814	0.782962	0.1618814
Overall				**0.310893**		
Ethereum						
Return Ethereum	0.0040333	0.0006186	0.0034147	0.1533795	0.391637	0.1533795
Risk Ethereum	0.0027875	0.0004099	0.0023776	0.1470403	0.3834583	0.1470403
Overall				**0.2724724**		
Litecoin						
Return Litecoin	0.0045007	0.0006254	0.0038753	0.1389653	0.3727805	0.1389653
Risk Litecoin	0.002958	0.000516	0.002442	0.1744267	0.4176442	0.1744267
Overall				**0.2886305**		
Ripple						
Return Ripple	0.0059536	0.0004676	0.0054861	0.0785388	0.2802477	0.0785388
Risk Ripple	0.0041753	0.0010161	0.0031593	0.2433539	0.4933091	0.2433539
overall				**0.2990093**		
Tether						
Return Tether	1.33e-06	1.02e-07	1.22e-06	0.0769558	0.2774091	0.0769558
Risk Tether	1.16e-06	3.25e-07	8.30e-07	0.2812897	0.5303675	0.2812897
Overall				**0.3338884**		

Notes: MC = correlation between dependent variables and its predictions.

5 Conclusions

The paper aims to provide further insights on the relations between the panic caused by the successive waves of the COVID-19 pandemic, measured through panic indexes, and the emerging and developed stock market performance measured through the stock indices and cryptocurrncies returns, and the market risk. We analyze the interrelationships in terms of causality using the structural equation modeling analysis. Our study reveals several important findings for academics, policy makers and regulators. First, our results suggest that changes in panic indexes resulting from the COVID-19 pandemic do not cause a significant impact on the Egyptian stock market due to the negative impact of COVID-19 crisis on the efficiency of the Egyptian stock market as one of the oldest emerging markets in the world (Mecagni and Sourial, 1999). Second, similarly to (Cervantes et al., 2022), panic indexes have a significant positive relationship with daily S&P 500 risk. We choose US stock market as the largest developed market, in the world. Third, our Structural Equation Model analysis results suggest that changes in panic indexes have a significant positive relationship with daily Bitcoin risk, daily Litcoin risk, and daily Ripple risk (Halaburda et al., 2020). Fourth, our results find a significant positive relationship between daily WTI Oil index returns and daily EGX30 stock returns. Fifth, our results find a significant positive relationship between daily VIX volatility index returns and daily Tether returns. Therefore, the Oil index and Tether can be considered as a safe haven asset during Covid19.

Future researchers should apply more advanced techniques apart from Causality models like GARCH models to examine the impact of Covid 19 panic indexes on cryptocurrencies and commodity market. Similar to (Marobhe, 2022) Bitcoin, Litcoin, and Ripple should be given priority over other cryptocurrencies to examine their ability as a safe haven during COVID.

Conflict of Interest Statement

The author certify that there is NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author.

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دراسة تأثير مؤشر الذعر الناجم عن فيروس كورونا (COVID-19) على العملات المشفرة ومؤشرات أسواق الأوراق المالية: دراسة مقارنة بين مصر والولايات المتحدة الأمريكية

ملخص:

على غرار (سرفانتس وآخرون، 2022)، تبحث هذه الورقة في العلاقة بين أسواق الأسهم في الاقتصادات الناشئة والمتقدمة، والعملات المشفرة، والخوف الناجم عن أزمة جائحة كوفيد -19 من يناير 2020 إلى مايو 2021. والعلاقات المحتملة هي تحليلها من حيث النماذج السببية.

تفترض الدراسة أن مؤشر الذعر لـCOVID-19، ومؤشر VIX، ومؤشر WTI، ومؤشر الذهب، وحالات الإصابة المؤكدة بـCOVID-19، وحالات الوفاة، ونسبة الوفيات هي المتغيرات المستقلة، في حين أن المتغيرات التابعة هي عوائد الأسهم للمؤشرين (EGX30 وP500&S)، عوائد العملات الرقمية الخمس (بيتكوين، إيثريوم، لايتكوين، ريبل، وتيثر)، ومخاطر السوق.

و بشكل عام، تشير نتائج تحليل نموذج المعادلات الهيكلية لدينا إلى أن التغيرات في مؤشرات الذعر الناتجة عن جائحة كوفيد-19 لها علاقة إيجابية كبيرة مع مخاطر أسهم P500&S اليومية، ومخاطر البيتكوين اليومية، ومخاطر الليتكوين اليومية، ومخاطر الريبل اليومية. علاوة على ذلك، هناك علاقة إيجابية كبيرة بين العائد اليومي لمؤشر خام غرب تكساس الوسيط والعائد اليومي لسهم EGX30. تظهر نتائجنا وجود علاقة إيجابية كبيرة بين عوائد مؤشر التقلب اليومي VIX وعوائد Tether اليومية.

الكلمات المفتاحية: مؤشرات الذعر، كوفيد-19، الأسواق الناشئة والمتقدمة، أسواق السلع الأساسية، العملات المشفرة، والنماذج السببية.