To what extent does COVID-19 affect Egyptian EGX30 and SMEs' firm value using GARCH Models?

Hebatallah A. Soliman
Assistant Professor of Economic, Faculty of Business Administration, Sinai University, Egypt.

Sherif El-halaby
Assistant professor of Accounting, Faculty of Business Administration, Arab Open University, Kuwait.
MSA University, Egypt.

Hussien Ahmed
Assistant Lecturer of Accounting, Faculty of Commerce, English section, Helwan University, Egypt.

Abstract

Through a comparison of Small and Medium Enterprises (SMEs) and listed firms on the Egyptian stock exchange, this research seeks to determine the effects of COVID-19 on the firm value (FV) for SMEs and the EGX 30 index through the period January 12, 2020, to December 31, 2021. We used a Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model to estimate the volatility of the stock returns. Empirical results find that the EGX30 index began to show relative stability by the end of 2020, while the TAMAYUZ index for medium and small enterprises is high volatility. Our findings demonstrate the differing effects of government activities during the epidemic on the two indicators (EGX 30 and TAMAYUZ).

Keywords- COVID-19; Firm Value; SMEs TAMAYUZ, EGX30, GARCH and Egypt.

1. Introduction

The world is currently experiencing a health catastrophe as a result of the COVID-19 outbreak, which began in China in

December 2019 and spread fast around the whole world. It has prompted the World Health Organization (WHO) to declare it a worldwide pandemic on March 11, 2020 (Albulescu, 2020). On December 28, 2021, there were 281,910,887 recorded incidents and 5,423,504 fatalities cases worldwide (WHO, 2021). Surprisingly, according to Shehzad and Sohail (2018), certain events or news might affect stock values to fluctuate. The original coronavirus has a detrimental impact as pandemic behavior is unknown.

To prevent the transmission of the COVID-19, every country has closed its markets and businesses, and people is required to remain in their homes. As a result, unemployment has increased; the supply side has been strained; and economic development and sales of the traveling segment have been hampered (Leduc and Liu, 2020). The worldwide stock markets were subjected to a massive drop in market value. Following the COVID-19, the market value of the Standard and Poor (S and P) 500 index was freed to 30 percent. The stock markets of Germany, France, and Italy saw a significant fall in their values throughout March, 2020. Moreover, the stock markets of the United Kingdom (UK), the United States (US), Hong Kong, Spain, and China had price declines of 21.4 percent, 14.9 percent, 14.7 percent, 25.1 percent, and 12.1 percent, respectively, from 08 to 18 March, 2020. According to Adam (2020), financial markets are on the verge of collapsing, as they have been across the Global Financial Crisis (GFC). COVID-19 prepared the globe for financial disasters more dangerous than the

GFC. Furthermore, the financial insecurity index based on Leduc and Liu (2020), has risen to the greatest level since the GFC, while the US 10-year treasury return index has fallen to the lowest level since the GFC. The Asian Development Bank estimated the global cost of COVID-19 at $4.1 trillion (ADB, 2021). As a result, Shehzad et al (2020) emphasized the significance of impressions of COVID-19 on stock markets around the world.

The COVID-19 may not be entirely harmful to all firms and industries. While most sectors suffer and their share value breaks, such as air travel and tourism, others, such as healthcare, may prosper (Mazur et al., 2020). According to Baldwin and Weder (2020), the financial and social consequences of the current crisis will be significant and long-lasting, but mostly uncertain. However, the SMEs remains untapped. Governments, therefore, issued a variety of policies and initiatives to alleviate the liquidity challenges experienced by enterprises, particularly SMEs, as well as to offer financial assistance to destitute people.

During this crisis, businesses are dealing with a variety of challenges such as decreased demand, cancellation of export orders, and a scarcity of raw materials and suppliers. We contend that one of the primary victims of the COVID-19 epidemic are SMEs, because SMEs, in comparison to large firms, frequently lack enough resources, particularly financial and managerial resources, and are unprepared for such disruptions, which are likely to last longer than expected (Prasad et al., 2015).

Additionally, these small companies rely heavily on regular corporate transactions and a limited number of customers. SMEs are the backbone of various global economies, providing returns and job creation for a large number of people worldwide. Moreover, as a result of a lack of appropriate government assistance, most SMEs experience economic decline and may even go bankrupt. SMEs have limited skill and resources to recover from such crises, particularly those working in growing nations such as Egypt, where there is a strong emphasis on SMEs' growth as well as political and economic volatility. As a result, the focus of this research has shifted to investigating the impact of the COVID-19 on Egyptian SMEs.

Numerous initial scholars focused on the COVID-19 impacts on stock market returns (Ashraf, 2020), while other highlight the COVID-19 influence on financial fluctuation (Lyócsa et al., 2020), business bonds (Nozawa and Qiu 2020) or Eurobonds (Sènea et al., 2020), exchange rate (Cardona and Serna 2020), and economic strategy uncertainty (Albulescu, 2020). In addition to utilizing numerous methodologies for assessing viral spread (Ahmar and Del Val, 2020) or analyzing the source of health security (Chang and McAleer, 2020), only a few articles highlight the COVID-19 influence on SMEs' financial return in emerging nations. We contribute to this new strand of literature. To the best of our knowledge, this is the first study that compares

the results of SMEs with listed firms for daily information for the entire years 2020, 2021.

We are inspired to perform this study for a variety of reasons. Our findings are consistent with the wave of research studies that have looked into the effects of COVID-19. The current researches focuses solely on the influence of COVID-19 on key indexes across stock markets, disregarding SMEs, which are the most impacted businesses during the pandemic. SMEs are the cornerstone of various economies across the world, providing income to a vast number of people. So this paper investigates the COVID-19's influence on this segment. Why are SMEs used in Egypt? According to Bary (2019), the SMEs segment in Egypt is a critical driver in the Egyptian economy and one of the fastest expanding fields for increasing economic growth and achieving sustainable development goals. Furthermore, Egypt is one of the pioneers and leading nations that develop stock for SMEs in the MENA region.

Whereas most earlier studies have focused on China and rich nations such as the US, there has been minimal attention on emerging countries. In terms of Egypt, none of the prior research have used secondary data or daily stock returns to assess the impact of COVID-19 on SMEs. We are equally motivated by Egypt's distinctiveness as a case study and how political policies interact with the epidemic. As a result, it is necessary to investigate the impact of the COVID-19 epidemic on Egyptian

SMEs. Additionally, the ongoing epidemic would severely impede the operations of these enterprises since SMEs are overly reliant on the cash economy, which has been negatively impacted by the pandemic. According to the literature, this study was prompted by Shafi et al (2020), who requested more research on the influence of COVID -19 on SMEs.

Therefore, the purpose of this study is to (1) examine the impact of the COVID-19 epidemic on the Egyptian financial market as assessed by daily stock returns throughout Egyptian SMEs and the Top 30 Firms listed on the EGX30. (2) We also want to compare the effects of COVID-19 on these two sectors for the entire years 2020, and 2021. We examined data for 26 SMEs registered on the TAMAYUZ EGX and also the top 30 firms listed on the EGX 30 index for daily stock market returns from January 2020 until December 2021 to achieve our goals.

We discovered a scarcity of literature focusing on both small businesses and emerging nations. We make a number of significant contributions to the current literature. First, we add to past research that track stock market responses to major disasters, extreme weather, and flu epidemics (e.g., McTier et al., 2013; Fleming et al., 2006). Second, we dig into the current and growing body of literature on the effects of the COVID-19 epidemic on financial markets (e.g., Ali et al., 2020; Schell et al., 2020; Zhang et al., 2020). Third, we contribute to the literature on developing-market responses to shocks and economic

recession (e.g., Dimitriou et al., 2013; Sugimoto et al., 2014). Fourth, our paper extends to past research that has looked at the impact of COVID-19 on the results of the SMEs sector (e.g., Shafi et al., 2020, Robinson and Kengatharan, 2020).

Fifth, this research provides to the scholarly track that is investigating SMEs in Egypt (e.g., Assem et al., 2020, Zaazou and Salman, 2020). Whereas most of these research relied on primary information from an online survey (questionnaire), we relied on secondary information that reflected the true situation for these organizations throughout the crisis. Finally, we contribute to the research on the effects of COVID-19 by comparing two separate indices, SMEs and listed firms. The following is a breakdown of the paper's structure: Section 2 provides a summary of the COVID-19 situation in Egypt and analyzes how the Egyptian government is dealing with the epidemic, particularly as it affects SMEs. The conceptual framework is shown in Section 3. The relevant literature and hypothesis development are presented in Section 4. Section 5 illustrates the methods used. Section 6 discusses the findings, followed by section 7's conclusions.

2. Egypt's COVID-19, government's role and SMEs

The first case of COVID-19 in Egypt was validated on February 16, 2020, and the first death case was recognized on March 9, 2020. From mid-February and mid-July, the number of confirmed cases increased rapidly to 82,000, resulting in about

4,000 fatalities, placing Egypt as Africa's second most afflicted nation, behind South Africa, in terms of deaths and cases (WHO, 2021). Based on the level of COVID spread in April 2021, it was listed as one of the most dangerous countries in the world. Egypt is one of the world's COVID19 hotspots, according to Shabir and Aijaz (2020). There were 215,484 confirmed cases and 12,694 deaths between January 3rd, 2020, and April 18th, 2021.

In March, EGX30 and TAMAYUZ EGX stocks produce asymmetrically disseminated massive negative returns in response to lockout decisions. Since its high on February 9th, the EGX30 has declined by 38%, reaching EGP 8,756 on March 18th, 2020. The EGX30 fell 9.34 percent the next day when Egypt announced the stimulus package on March 14 as shuttered schools, 2020 (https://www.egx.com.eg/ar/Indices.aspx). It reached a low of 8,756.70 on March 18, 2020, with 166 instances and four fatalities. EGX30, on the other hand, is expected to progressively rebound to 10,885.11 on November 23, 2020, with 113027 cases recorded and 6548 total fatalities. Most organizations modify their employment expenses by laying off staff as soon as they are prohibited from continuing operations due to mandatory isolation. As a result, this roadmap for the loud drop in spending and economic activity is lowering the stream of predicted future cash flows.

Following the Egyptian government's decision to reopen, some SMEs ran into difficulties resuming operations, resulting in

further significant financial losses and putting several at risk of permanently shutting. According to a recent analysis of the pandemic's effects on 283 Egyptian SMEs, 3 percent permanently halted operations and 54 percent temporarily halted operations owing to verified cases inside the businesses, government directives, or a lack of demand (CHF MCSE, 2020). Sixty percent of the participating SMEs had labor shortages, resulting in a 25 percent to 39 percent drop in revenue. Over the previous decade, SMEs have become one of Egypt's most frequent company structures. Based on Bary (2019), Egypt's SMEs sector is a critical driver of the Egyptian economy and one of the fastest-growing industries that boost economic development while also ensuring the country's long-term viability. SMEs are one of the most important factors in the creation of jobs in the Egyptian market, as well as one of the most significant effects on which the government is focusing in order to promote the country's economic development.

According to Egypt's SMEs Law (No. 141, 2004), SMEs are classified based on the number of employees (up to 50), capital (up to 5 million EGP), and income (up to 10 million EGP). The Egyptian Central Bank divided SMEs into three categories: micro (less than ten employees), small (10 to 200 employees), and big (more than 200 employees) (Ayadi et al., 2017). In Egypt, SMEs account for around 75 percent of economic growth and 80 percent of employment. In Egypt, SMEs account for more

than 90% of all businesses, approximately 60% of employment, and 75% of domestic value-added (AFDB, 2016). Since 2011, the Nile Exchange (NILEX) which is changed into EGX Tamayuz has been the first market in MENA area for funding SMEs. EGX Tamayuz provides unrestricted funding to exceptional firms in a variety of industries, allowing them to increase their competitiveness. According to Elseoud et al (2019), SMEs in Egypt are dominated in the industrial and trade areas, with 51 percent and 40 percent, respectively; 4 percent for tourism; 3 percent for construction; and lastly, 2 percent for other operations. Micro-companies account for 91% of SMEs in Egypt, SMEs account for 8%, and large-scale businesses account for only 1%. (CAPMAS, 2018). The Egyptian Central Bank stated that SMEs' portion of funding represents the lowest rate of financing, ranging from 2 to 4% of total bank funding.

3. Conceptual Framework

The Efficient Market Hypothesis (EMH) asserts that markets are efficient. Every asset's price, based on the work of Fama (1965), must embody basic information about the asset. For more than 30 years, it has been the most widely accepted investing philosophy (from the early 60s to the mid-90s). The EMH, nevertheless, fell out of favor among academics and financial markets with the advent of behavioral finance in the early 1990s. Not as an additional assumption, but as a contradictory and substitute answer, the notion of the effect of human behaviors on

investment decision-making was born. According to Statman (2008), it is important to consider the psychology of market players in order to comprehend the movement of asset values. Because psychology is concerned with human judgment and conduct, it may give insight into how human activities differ from standard economic principles. According to Barberis (2007), investors' less rational choices, which are affected by biases and psychological variables, are likely to impact some financial repercussions.

Several variables impact global financial markets, including economic processes, institutional and political limits, information dissemination, and accessibility, among others. Short-term price swings, on the other hand, are frequently driven by market players' emotions, which are typically affected by emotion or received news and are not always founded on logic. Market players are inclined to react to information regarding specific occurrences, but they are extremely sensitive to irrelevant information and frequently underreact to important events (Bikas et al., 2013).

Understanding market participants' psychology, according to Kourtidis et al (2011), is critical for explaining market irregularities such as crashes and grasping the efficiency of financial markets. This may appear to indicate that fully comprehending and studying the global financial market without considering the behaviors of market players is impossible. According to human psychology, information becomes

increasingly unequal as a result of the dynamics of financial crises, with news having a higher impact than fundamentals. As a consequence, there's a lot of indication that market players' reactions to events drive financial markets (De Bondt et al., 2008). Behavioral finance is concerned in how individuals "really" behave in a financial market. Traditional financial theories analyze how people behave for wealth maximization.

The price might vary from the underlying value because market players have diverse perspectives on how to interpret fresh information. According to Barberis et al (1998), one essential aspect in the overreaction theory is that a string of good or negative news will induce market participants to overreact if they feel the trend will continue. There is a differential depending on whether the material is public or private. As a result, market players are overconfident in their private knowledge, causing overreaction in the market. They, on the other hand, have a tendency to underreact to widespread public information. Market players often react disproportionately to information, resulting in temporary deviation from fundamental value. Within a short amount of time, when market players process the facts, the price generally reverts to underlying value (Fakhry, 2016).

Asset returns are lower after and during pandemics, according to the research on the effect of pandemics, such as Beutels et al (2009). People tend to cease investing after such events and opt to limit their losses by withdrawing their savings,

resulting in a drop in economic activity and, as a result, a drop in overall growth. Because economic activity has nearly come to a standstill, most investment returns using COVID-19 are currently negative. Investor behavior shifts are largely driven by the protection of personal money, since investors are more concerned with their own safety than the wellbeing of the entire society (Rababah et al., 2020). Markets react to shocking news, and when additional information becomes available and consumers have a better grasp of the ramifications, the market corrects itself. COVID-19 represents anxiety about the unknown, and it is this anxiety that generates responses. The investor underreacting and overreacting theory guides us in our interpretation of stock price behavior. Due to the obvious crisis, every stakeholder is likely to lose money. When an extreme catastrophe arises about which little is known, or at best, very little is known, governments' first reaction is to overreact in fear of the disaster. Therefore, when more data about the crisis becomes available - that is, as policymakers gain confidence in dealing with the crisis and its implications - their reactions will be corrected. Because markets are a government activity, they will react to government choices (Phan and Narayan 2020).

4. Hypotheses Development

4.1 Impact of crisis and COVID-19 on the business and FV

Markets have previously been impacted by a pandemic, which resulted in significant loss of life and the economy. The

feast of Ebola illness in 2013–2016, which caused a loss of 53 billion dollars in the US, would be a clear instance, according to Fernandes (2020). In Toronto, Gupta (2005) looked at the economic effects of isolation. He backs up the unfavorable perception. SARS is the paramedic that has been studied in the literature. Zhang et al (2003) examine the impact of SARS on China's stock market. Similarly, Nippani and Washer (2006) study the impact of SARS on stock markets in 8 different countries and came to the conclusion that SARS had detrimental consequences. For Ichev and Marincs (2016), the Ebola endemic's proximity to the US market had a negative impact on the market. Del Giudice and Paltrinieri (2017) agree that Ebola pandemic has a detrimental impact on market returns. Macciocchi et al (2016) examined Zika virus's economic impact in Brazil, Argentina, and Mexico. A day after the shock, the mean return rate was -0.90 percent.

COVID-19's influence on market instability has been studied in the literature, with varied findings. Relying on the S & P 500 market index, Yilmazkuday (2020) finds that a 1% increase in COVID-19 collective daily-definite number is associated with a 0.01 percent concession the next day. When COVID-19 was made public, Corbet et al (2020a) discovered that enterprises containing the term "corona" in their names saw significant negative hourly returns and a surprisingly substantial increase in hourly instability. On the other hand, Onali (2020) contends that

there has been no significant impact on US stock market performance. Albulescu (2020) investigated the effects of COVID-19 on the financial instability of the Chinese stock market for 40 days after COVID-19's worldwide surveillance was initiated. He demonstrated that the number of cases reported was associated with financial instability in a negative way. Through the COVID-19, Liu et al (2020) shown that Asian stock indexes had a lower anomalous return than other indices.

Alfaro et al (2020) used data from the US market and observed that COVID-19 caused a decline in market value. COVID-19 has a detrimental impact on stock market returns throughout the Shanghai Stock Exchange and the Hang Seng, according to Al-Awadhi et al (2020). Ashraf (2020a) examined data from 64 nations and concluded that COVID-19 had a negative impact on all stock markets. He argues that, the negative reaction was only significant for the increase in the number of cases, not for the number of fatalities. Similarly, the evidence confirms COVID-19's negative impact on daily stock market returns (Shehzad et al., 2020). Nonetheless, Zeren and Hizarci (2020) identified no correlation between COVID-19 and stock market performance in 3 nations namely: Germany, France, and Italy. In terms of developing markets, Beck et al (2020) looked at 10 developing markets and showed that COVID-19 had a negative impact on the majority of enterprises. Haroon and Rizvi (2020) examined 23 emerging nations and found that a decrease

(increase) in corona cases is linked to improved (decreased) liquidity in financial markets. Whereas most earlier research has focused on the period of the pandemic, Zaky et al (2020) look at stock prices before and after COVID-19 in 56 Indonesian companies. They indicate a considerable difference in stock closing prices before and after the epidemic.

When it comes to the relationship between COVID-19 cases and stock market returns, Zeren and Hizarci (2020) revealed that the total number of COVID-19 cases has an integrated relationship with stock markets. Several studies back up the same negative conclusion (e.g., Ashraf, 2020a). Many studies have found a negative correlation between the death of COVID-19 and the revival of the stock market (e.g., Yilmazkuday, 2020). Albulescu (2020) predicts that a higher mortality rate will lead to increased financial market instability. According to Alber (2020), the stock market's return appears to be more sensitive for COVID-19 instances than fatalities, and for accumulative rather than fresh or daily numbers. He agrees that the COVID-19 spread has a detrimental impact on stock market results.

4.2 Influence of COVID-19 on SMEs

SMEs are more vulnerable to disaster than large corporations since they are economically fragile, have less resources, and are smaller (Bartik et al., 2020). The impact of the crisis on SMEs might be direct or indirect (Eggers, 2020). The direct impact includes supply chain issues, property devastation, and inventory

losses. Damage to public infrastructure such as communication, energy, and transportation systems, as well as roads, has an indirect effect of higher production costs and business discontinuities. For the International Trade Center (2020), SMEs have been on the front lines, as customers have remained at home, supply chains have been disrupted, and small-scale enterprises, which provide 70% of job opportunities in markets, have been put under extreme stress.

Many studies have documented the devastating impact of such events on SMEs. According to Asgary et al (2020), the 1999 earthquake in Turkey severely impacted SMEs, with expenditures estimated at $1.1–4.5 billion. According to Auzzir et al (2018), the 2011 floods in Thailand affected 557,637 businesses, resulting in 2.5 million employment losses, with 90 percent of these businesses being SMEs. In Malaysia, floods in 2014 impacted around 13,000 small businesses. Samantha (2018) stated that in 2016, a heavy storm struck the western areas of Sri Lanka, wreaking havoc on society in general and SMEs in particular. SMEs in a number of developed regions have suffered similar disasters. According to Bennett and Phillipson (2004), SMEs throughout the United Kingdom suffered massive losses as a result of the 2001 Foot and Mouth Disease, with non-farming losses assessed at £5 billion.

In terms of the effects of COVID-19 on SMEs, Rababah et al (2020) claim that SMEs are the worst hit by the crisis. Based on

an online survey of 184 Pakistani SMEs, Shafi et al (2020) reported that over 83 percent of businesses were unprepared or lacked a strategy for dealing with a circumstance that resulted in a decrease in revenue. A survey of 5,800 SMEs in the United States by Bartik et al (2020) looked into how COVID-19 impacts small businesses. Since January 2020, 43% of the seats have been reserved. Based on SMEs in Serbia, Beraha and Duricin (2020) found that the crisis has had a detrimental impact on SMEs' routine activities. 20% of businesses have made the switch to working remotely. Around 10% encountered additional challenges, as a reduction in resources, salary payment, and poor output.

4.3 Evidence across Egypt

Egypt has also gone through a severe catastrophe brought on by natural calamities. Mazur et al (2020), for example, investigate firms' immediate reactions to COVID-19 and the single-day dangerous occurrences EGX30 on March 15, 2020. They discover that companies in a variety of industries, such as transportation, shipping, automobiles, and real estate, are the worst impacted, losing nearly 8% of their market value in a single day. Nonetheless, the stock market makes a profit from March 18 through November 26, 2020. Abdelrhim and Elsayed (2020) investigate the effect of COVID-19 on EGX30 from March 1 to May 10, 2020. They go on to say that the stock market appears to be more sensitive to cumulative death than

daily deaths from the virus, and those new cases appear to be more sensitive than aggregate instances of the virus.

Assem et al (2020) analyze the differences in and variables of COVID-19 corporate risk awareness across 166 Egyptian SMEs based on a survey of these companies. Across geographical locations, risk awareness was significantly asymmetric. Firms with longer cash flow coverage durations and higher asset values appear to be in lower risk phases deliberately. Similarly, Zaazou and Salman (2020) use a semi-structured interview to investigate the impact of COVID-19 on SMEs in Egypt. The impresarios believe that businesses should be adaptable and seek out opportunities for innovation. As a result, we propose that

H. There is a negative impact for COVID-19 pandemic on the stock returns for the EGX- TAMAYUZ index and EGX-30 index by the same level

5. Data and methodology

Two forms of companies from Egypt are included in our sample. The EGX30 index is used in our study to express the stock returns of firms listed on the Egyptian Stock Exchange, while the TAMAYUZ index is used to describe the market for medium and small enterprises listed on the stock exchange. The EViews8 software was used for the econometrics analysis. Moreover, we obtained data from: The Egyptian stock exchange website, the University of Oxford, our COVID-19 world in data website.

The sample period was set to run from January 12, 2020, to

December 31, 2021. The early COVID-19 confirmed instances and worldwide government reactions primarily occurred during this time period, thus we picked it as our sample period. According to Ramelli and Wagner (2020), the most important time for market response to this epidemic was from January 20 to March 20, 2020. Similarly, the average worldwide government responses curves for Hale et al (2020a) constricted and even started dropping from mid-April ahead. The majority of the research focuses on the months of January through April. We extended the time to December 2021 to examine how our results compare to those from earlier research. Why Egypt, specifically? For a variety of reasons. access to data about Egypt and TAMAYUZ stock. Egypt is a developing country with a high COVID-19 risk rating and a large contribution from SMEs. Egypt was classified Level 4 in April 2020, indicating a very high level of COVID-19 impact (CDC, 2021).

Egypt, on the other hand, is the only nation in the MENA region to have a favorable short-term prognosis, with real GDP growth of 2.2 percent in COVID-19 in 2020. Since 2010, Egypt has been one of the first developing nations in the Middle East to establish a stock exchange for SMEs (http://egyptsmes.com.eg/). Egypt has 2.5 million small and medium-sized businesses, accounting for more than 90% of the country's businesses and 75% of its employment. Egypt was one of the main nations in the MENA region to assist SMEs during COVID-19, announcing a

100 billion EGP fund for industrial SMEs in 2020, which was expanded to all industrial sectors after the epidemic, demonstrating the government's understanding of SMEs throughout the pandemic. The prior data regarding Egypt and SMEs, as well as how they interact with COVID-19, distinguishes Egypt from other nations in terms of COVID-19's repercussions, which make for a unique sampling for our paper.

5.2 Model variables and Research models

Our chosen companies' FV is calculated using daily stock market returns from January 2020 to December 2021. These data were taken from the Egyptian stock exchange's official website (https://www.egx.com.eg/ar/Indices.aspx). Total-cases, new-cases, total-deaths, and new-deaths are the four elements that make up the COVID-19 variable, Stringency-index, Containment-index, and total vaccinations are the three elements that make up the Governmental Interventions. This data comes from COVID-19 dataset at Our World in Data (https://ourworldindata.org/coronavirus/country/egypt). The factors for this paper are listed in Table 1. To put our hypotheses to the test, we developed two models:

Model (1): Impact of COVID-19 on the FV for EGX 30 index

$$DSR - EGX30_{it} = \beta 0 + \beta 1\ TC_{it} + \beta 2\ NC_{it} + \beta 3\ TD_{it} + \beta 4\ ND_{it} + \beta 5\ SI_{it} + \beta 6\ CI_{it} + \beta 7\ TV_{it} + \varepsilon_{it} \quad (1)$$

Model (2): Impact of COVID-19 on the FV for the TAMAYUZ EGX-SMEs index

$$DSR - TAMAYUZ_{it} = \beta 0 + \beta 1\ TC_{it} + \beta 2\ NC_{it} + \beta 3\ TD_{it} + \beta 4\ ND_{it} + \beta 5\ SI_{it} + \beta 6\ CI_{it} + \beta 7\ TV_{it} + \varepsilon_{it} \quad (2)$$

Table 1: Variables and Definition

Symbol	Variables	Definition
Firm value		
EGX& TMY	Daily stock return	It measured as daily change in EGX30, TAMAYUZ index, value and measured thru Egyptian currency.
COVID-19 pandemic outbreak		
TC	Total-cases	Total confirmed COVID-19 cases per million people.
NC	New cases	Daily new confirmed COVID-19 cases per million people.
TD	Total-deaths	Total confirmed COVID-19 cases per million people.
ND	New deaths	Daily new confirmed COVID-19 deaths per million people.
Governmental Interventions		
SI	Stringency-index	It archives information on social distancing rules, it a merged measure based on 9 reply indicators counting school closures, workplace closures, and travel bans. It scaled to a value from 0 to 100 (100 = strictest).
CI	Containment-index	It a merged measure according to 13 policy indicators counting school closures, work place closures, travel bans, testing policy, contact tracing, face coverings, and vaccine policy. It scaled a value from 0 to100 (100 = strictest).
TV	total vaccinations	Total people have COVID-19 vaccinations

6. Analysis and discussion

6.1 Descriptive statistics

Table 2 shows the descriptive statistics for all variables utilized in our study. The mean of stock returns for listed companies in EGX 30 index and TAMAYUZ index was 9.29 and 8.06 respectively. The mean values of total cases, new cases, total-deaths and new-deaths are 9.71, 12.57, 3.34 and 6.22 cases respectively. According to the standard deviation statistics, the TAMAYUZ index has the greatest value, indicating that the EGX index is more stable. While the lower and higher values reflect a wide range in the TAMAYUZ index's closing price, there is convergence in the minimum and upper values for the EGX index, indicating that it is more stable than the TAMAYUZ index.

Table 2: Descriptive Statistics

Variable	Max	Min	Mean	Std. Dev.
Legx	9.38	9.19	9.29	0.05
ltmy	8.46	7.67	8.06	0.29
ltd	9.98	9.38	9.71	0.15
ltc	12.8	12.20	12.57	0.16
lnd	4.88	1.39	3.34	0.81
lnc	7.54	3.43	6.22	0.96
si	65.7	33.3	46.43	6.86
Ci	62.3	41.4	46.34	5.38
Tv	17.8	12	15.61	1.6

We start with an inspection of the daily returns. The results in Figures (1 and 2) shows that all variables fluctuate throughout this period, reflecting the influence of the beginning and continuing of the Covid-19 crisis. While the EGX30 index began to show relative stability by the end of 2020, as returns seem to vary near zero, the TAMAYUZ index for medium and small enterprises is volatile. We measured the time before and after COVID-19 became a global pandemic using daily stock market returns from January 2020 to December 2021. There is a volatile cluster phenomenon in financial time series such as stock prices, which means that there are periods of time when a huge price fluctuation arises and remains for a subsequent period, followed by times of relative stability. For example, in market shares, there are numerous news and other external economic events that may affect the shape of the time series for determining prices, such as the drop in oil prices and the Corona epidemic crisis (Covid-19).) It may remain for a while, as we frequently observe huge positive and large negative observations in financial time series tend to cluster (Gujarati et al, 2004).

Figure 1: The trend of returns for the study variables During the period January 12, 2020 to December 30, 2021

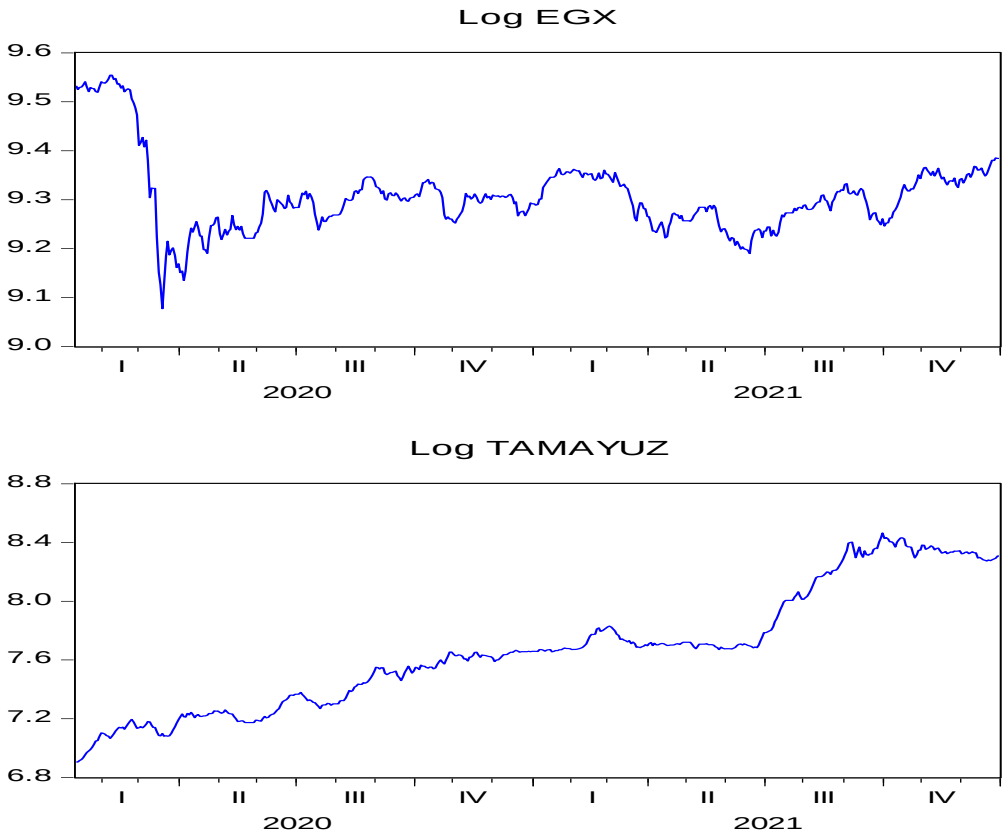
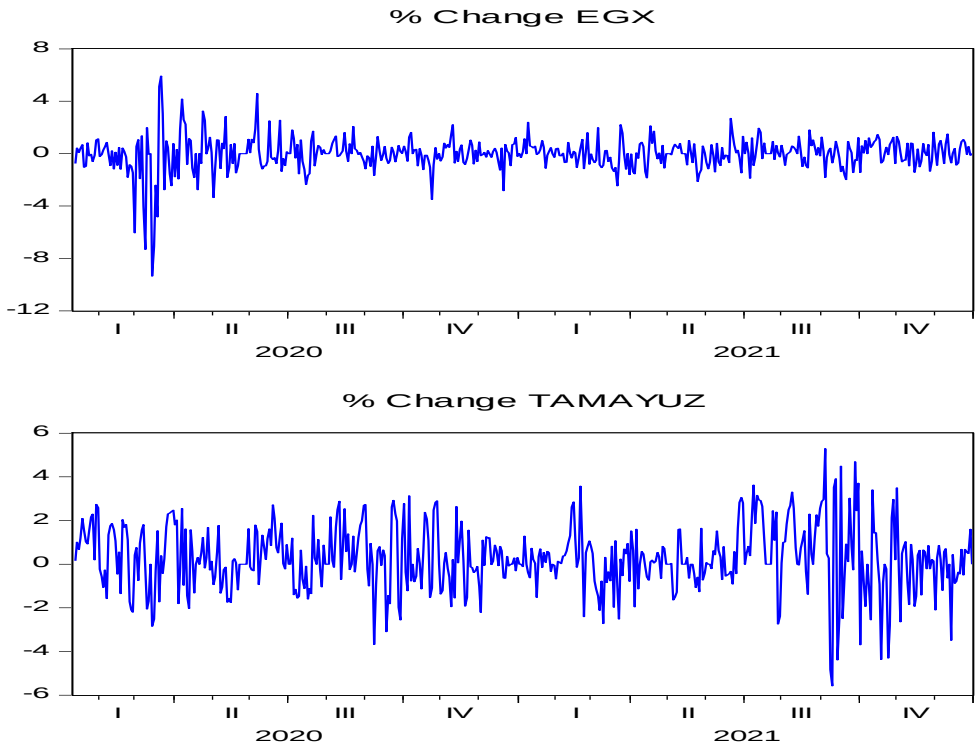


Figure 2: The percentage change in stock return



6.2 Correlation Matrix

Table 3 describes the correlation matrix that the index of governmental intervention by Stringency-index and Containment-index have a negative impact on the closing price of each of the EGX index, the number of new infections and the number of new deaths has a negative impact on stock prices listed in TAMAYUZ index. While we observed a positive

correlation between the number of daily covid-19 infections, deaths and the EGX index.

Table 3: Correlation Matrix

	LEGX	LTMY	CI	LNC	LND	LTC	LTD	LTV	SI
LEGX	1								
LTMY	0.734	1							
CI	-0.308	-0.622	1						
LNC	0.154	-0.009	0.304	1					
LND	0.064	-0.128	0.297	0.892	1				
LTC	0.693	0.801	-0.659	0.028	0.011	1			
LTD	0.707	0.802	-0.660	0.005	-0.011	0.998	1		
LTV	0.675	0.847	-0.652	0.019	-0.021	0.983	0.978	1	
SI	-0.175	-0.519	0.975	0.322	0.318	-0.520	-0.518	-0.522	1

**. Correlation is significant at the 0.01 level (2-tailed) and *. Correlation is significant at the 0.05 level (2-tailed).

6.3 Econometrics Model

Financial time series are unpredictable. on the other hand, the first differences are normally static, but these differences usually exhibit substantial variations, or the phenomenon of instability develops, implying that the variation of the financial time series varies greatly with time. As a result, Engle (1982) discovered the conditional autoregressive variance (ARCH) models. It is the first conditional autocorrelation model for error variance heterogeneity in which the variance can be modelled over time. As a result, we must consider that the conditional heterogeneity in the series data may be significantly influenced by the values of the squares of the residual series for previous periods, and that by doing so, we can clarify the

conditional heterogeneity and provide an explanation for the continuation of the fluctuations in it. The ARCH model's conditional variance equation is represented as follows:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{p} \alpha\, \varepsilon_{t-i}^2 \qquad (1)$$

Equation 1 is a function of variables with an error term. σ_t^2 (Conditional variance) is one period ahead of forecast variance based on past information. α_0 is a constant term; ε_{t-i}^2 (ARCH term) is news about volatility from the previous period measured as a lag of squared residual from the mean equation.

When studying the statistical parameters of financial time series, the importance of the prominent facts that influence the outcome of these time series appears, and these features include excessive volatility, thickening of the tails of the unconditional distribution, and the absence of autocorrelation of the observed values, as GARCH models seek to simulate what is happening in the market through statistical treatment of returns and their excessive volatility. Bollerler (1986) proposed GARCH models, which are considered as a generalisation of the autoregressive conditional variance and may be explained by the following equation:

$$\sigma_t^2 = \alpha_0 + \sum_{i=1}^{p} \alpha\, \varepsilon_{t-i}^2 + \sum_{j=1}^{p} \delta\, \sigma_{t-j}^2 \qquad (2)$$

Equation 2 is a function of variables with an error term. σ_t^2 (Conditional variance) is one period ahead of forecast variance based on past information. α_0 is a constant term; ε_{t-i}^2 (ARCH term)

is news about volatility from the previous period measured as a lag of squared residual from the mean equation. σ^2_{t-j} (GARCH term) is the last period forecast variance. The (1,1 in the GARCH refers to the presence of first order autoregressive GARCH term and the first order moving average ARCH term. An ARCH model is a special case of GARCH specification in form of GARCH (0,1).

That is, the expected conditional variance of the model depends not only on the square of the amount of error in the previous late time period as in ARCH (1) but also on its conditional variance in the previous late time period. This study was used to determine the effect of COVID-19 on Egyptian EGX30 and SMEs' firm value on a general autoregressive model conditional on covariance GARCH (1, 1). To estimate the dynamic economic models, a time-series stability test called Unit Root Tests is conducted, and one of the most widely used tests is the Dickey-Fuller (DF) test. The Dickey-Fuller test requires that the standard error u_t be a series of white disturbances, which means that there is no autocorrelation between the residuals (errors). But in cases where the error is auto-correlation, a new test called the Augmented Dickey-Fuller Test is performed, where this test is done by adding lags to the variables in the equation for the test. The extended Dickey-Fuller test is as follows:

$$\Delta y_t = \Psi y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + u_t$$

There are several of unit root tests, including the Phillps-Perron (PP) test which takes into account the probability of autocorrelation between residuals, a nonparametric test by modifying the Dickey-Fuller test and using the same distribution. In addition, there is the Kwiatkowski, Phillips, Schmidt and Shin(KPSS) Test. In this test, the null hypothesis is that time series are stable around a specific direction, where it is assumed that the series has the sum of deterministic trend, and errors are assumed to follow a condition random walk and stationary error.

6.4 Unit root test

To apply the GARCH model, the time series must be stable. Augmented Dickey-Fuller and Phillips-Perron tests were used, and Table (4) shows the results of unit root tests for variables. It is clear that all the variables are unstable in the level and stable in the first difference.

Table 4: Unit Root Test

Variablies	ADF-test		PP –test	
	Level	Difference	Level	Difference
Legx	-0.39	-17.54*	-0.45	-17.47*
$ltmy$	2.96	-16.34*	3.01	-16.61*
ltd	1.82	-4.71*	1.09	-21.52*
ltc	3.01	-9.55*	1.02	-20.47*
lnd	-0.46	-32.53*	-0.85	-35.69*
lnc	-0.27	-29.99*	-0.29	-28.69*
si	-0.53	-10.37	-0.51	-19.91*
Ci	-0.13	-19.85*	-0.26	-20.57*
Tv	3.28	-4.16*	3.63	-13.89*

*Signficant at 1%,

6.5 GARCH (1.1) test

Table 5 decribes the results of GARCH (1.1), the effect of variables on the closing price of the EGX index, through the variance equation, that each of the closing index and following health measures, the total number of cases of Covid-19 and the number of new daily deaths have a significant negative effect, while the total deaths, the number of new daily infections, and the total number of people who received the corona vaccination have a positive and moral effect. We note that the coefficients α of the ARCH effect and ß of the ß effect of GARCH are significant as the variance rates indicate the highest persistence of volatility as the sum of α and ß approaches one. The diagnostics checks on all models show that there is no serial correlation in the residuals, the residuals follow a normal distribution, and the $ARCH\ LM\ test$ test reveals that there is no effect of ARCH in the residuals.

Table 5: Results of GARCH (1-1)

Variables	EGX(1)	EGX(2)	EGX(3)
Mean Eq			
c	15.63* (0.216)	15.87* (0.533)	15.99* (0.069)
Ci			-0.005** (0.002)
Si	-6.14E-05 (0.000)		0.004** (0.001)
Tc	-3.008* (0.033)	-3.057* (0.184)	-2.94* (0.062)
Td	3.198* (0.070)	3.235* (0.197)	3.08* (0.080)

Nc	7.68E-05* (1.09E-05)	7.80E-05* (9.13E-06)	7.5E-05* (1.2E-05)
Nd	-0.0007* (0.000)	-0.0008* (0.000)	-0.0006** (0.000)
Tv	0.024* (0.003)	0.025* (0.003)	0.023* (0.002)
variance Eq			
c	-0.002* (0.000)	-0.0003 (0.000)	0.0003 (0.0004)
α	0.468* (0.161)	0.162* (0.052)	0.24* (0.08)
ß	0.302** (0.1696)	0.602* (0.0984)	0.60* (0.10)
Ci			-1.0E-05 (2.2E-05)
Si	-1.88E-06 (4.57E-06)		4.2E-06 (1.49E-05)
Tc	-7.88E-05* (1.39E-06)	-1.96E-05 (0.001)	-2.81E-07 (2.20E-05)
Td	0.0004* (1.25E-05)	-3.08E-05 (0.001)	-1.47E-05 (8.62E-05)
Nc	1.58E-07 (1.29E-07)	1.7E-07** (6.96E-08)	1.79E-07** (9.47E-08)
Nd	-2.76E-06 (3.20E-06)	-3.8E-06** (1.6E-06)	-2.44E-06 (1.59E-06)
Tv	-3.90E-05* (1.27E-06)	1.79E-05 (1.81E-05)	8.03E-06 (2.74E-05)
Adj. R^2	0.66	0.64	0.65
X^2_{nor}	0.5222 [0.770]	3.089 [0.213]	3.647 [0.161]
$ARCH_{LM\ test}$	1.838 [0.142]	1.350 [0.135]	2.070 [0.105]

*, **, *** signficant at 1%, 5%, 10%, X^2_{nor} Normal distribution.

Table 6 shows the results of GARCH (1.1) which explains the effect of variables on the closing price of an index of SMEs, through the variance equation, that each of the Stringency-index

(SI) imposed by the government, the total number of cases of Covid-19 The number of new daily deaths affects negatively and significantly, while the total deaths, the number of new daily infections, and the total number of people who received the corona vaccination have a moral and positive effect. We note that the coefficients α of the ARCH effect and ß of the ß effect of GARCH are significant as the variance rates indicate the highest persistence of volatility as the sum of α and ß approaches one. The diagnostics checks on all models show that there is no serial correlation in the residuals, and the residuals follow a normal distribution, $t\ test$ also reveals that there is no effect of ARCH on the residuals. Table (7) decribes the comparison between EGX 30 and Tamayoz index. When comparing Model (1) between each of the EGX index and the Tamoyoz index, we reveal that the negative impact of each of the closure index, the total number of Covid-19 infections, and the number of daily deaths is higher for the Tamoyoz index.

Table 6: Results of GARCH (1-1)

Variables	TMY(1)	TMY(2)	TMY(3)
Mean Eq			
c	55.81* (4.578)	23.27* (3.323)	6.68* (0.278)
Ci			0.003 (0.009)
Si	-0.007* (0.001)	-0.007* (0.001)	-0.013** (0.007)
Tc	-12.44* (1.270)	-1.560* (0.304)	
Td	10.51* (1.198)		

Nc	0.0002* (3.80E-05)	0.0001* (5.10E-05)	9.84E-05** (4.72E-05)
Nd	-0.002* (0.000)	-0.002* (0.000)	-0.0014** (0.000)
Tv	0.436* (0.029)	0.303* (0.033)	0.119* (0.009)
variance Eq			
c	0.015* (0.000)	0.016 (0.188)	0.014 (0.023)
α	0.49*** (0.267)	0.16** (0.067)	0.25** (0.115)
ß	0.40** (0.168)	0.60* (0.209)	0.60** (0.25)
Ci			-7.70E-05 (0.000)
Si	-4.54E-05 (0.000)	-4.95E-05 (8.46E-05)	-5.20E-05 (0.000)
Tc	-0.0002 (0.002)	-0.00003 (0.016)	
Td	-0.0002 (0.002)		
Nc	4.83E-06* (7.87E-07)	-1.95E-06 (4.09E-06)	3.73E-06 (5.22E-06)
Nd	-5.86E-05* (2.22E-06)	-4.31E-05 (4.51E-05)	-4.76E-05 (6.38E-05)
Tv	-0.0005 (0.0004)	-0.0003 (0.001)	-0.0005 (0.000)
Adj. R^2	0.78	0.75	0.68
X^2_{nor}	5.905 [0.053]	4.104 [0.128]	3.382 [0.184]
$ARCH_{LM\ test}$	2.741 [0.067]	1.362 [0.098]	1.543 [0.106]

*, **, *** signficant at 1%, 5%, 10%, X^2_{nor} Normal distribution.

Table 7: Comparing between each of the EGX index and the TAMAYUZ index

Variables	TMY(1)	EGX(1)
Mean Eq		
c	55.81* (4.578)	15.63* (0.216)
Si	-0.007* (0.001)	-6.14E-05 (0.000)
Tc	-12.44* (1.270)	-3.008* (0.033)
Td	10.51* (1.198)	3.198* (0.070)
Nc	0.0002* (3.80E-05)	7.68E-05* (1.09E-05)
Nd	-0.002* (0.000)	-0.0007* (0.000)
Tv	0.436* (0.029)	0.024* (0.003)
variance Eq		
c	0.015* (0.000)	-0.002* (0.000)
α	0.49*** (0.267)	0.468* (0.161)
ß	0.40** (0.168)	0.302** (0.1696)
Si	-4.54E-05 (0.000)	-1.88E-06 (4.57E-06)
Tc	-0.0002 (0.002)	-7.88E-05* (1.39E-06)
Td	-0.0002 (0.002)	0.0004* (1.25E-05)
Nc	4.83E-06* (7.87E-07)	1.58E-07 (1.29E-07)
Nd	-5.86E-05* (2.22E-06)	-2.76E-06 (3.20E-06)
Tv	-0.0005 (0.0004)	-3.90E-05* (1.27E-06)
Adj. R^2	0.78	0.66
X^2_{nor}	5.905 [0.053]	0.5222 [0.770]
$ARCH_{LM\ test}$	2.741 [0.067]	1.838 [0.142]

*, **, *** signficant at 1%, 5%, 10%, X^2_{nor} Normal distribution.

7. Conclusion remarks

Stock exchanges play a vital function in allowing businesses to raise additional funds from the general public, allowing them to grow their operations. As a result, a well-functioning stock market is critical for economic growth, particularly in developing countries like Egypt. We investigated the impact of COVID-19 cases on the financial performance of SMEs and EGX30 listed firms. For that purpose, we utilized daily stock market returns from January 2020 to December 2021. The volatility of stock returns is one of the major concerns among market participants. Highly volatile markets erode investor trust, lowering total market capitalization as a result of the risk of losses associated with market unpredictability. Stock markets that are less volatile are thought to be more stable, which gives investors more confidence and encourages them to invest their money. As a result of our findings, a variety of policy proposals were made to lighten the burden on SMEs and publicly traded firms in developing nations.

Our study's findings and policy recommendations are relevant for policymakers seeking to assist SMEs during difficult periods such as COVID-19. Our supported strategy may lead the government in establishing, particularly during difficult times, the most effective initiatives for supporting businesses across many industries. Our findings demonstrate the differing effects of government activities during the epidemic on the two indicators (EGX 30 and TAMAYUZ). As a result, every action or activity

undertaken by any government in response to a crisis should take into account all potential repercussions across various sectors or indices before being implemented. Our findings suggest that a certain governmental intervention has a greater favorable and effective impact on decreasing the negative impacts of the COVID-19 and boosting company financial performance than other initiatives. This can assist governments in prioritizing their policies and activities in dealing with crises.

Our paper gives relevant theoretical and practical implications concerning the impact of COVID-19, although several limits remain in the analysis, leaving opportunity for further research. First, our article concentrated on a single country, Egypt. As a result, future study may include a variety of developed and developing economies, as well as comparisons that yield the results in this track. Second, whereas our study assesses the impact of COVID-19 on the microeconomic level using daily stock returns for publicly traded firms, researchers should consider the effect of this global epidemic on the macro - economic level, like financial sector strength and confidence for countries and foreign direct investments. Third, our sample size was insufficient to adequately reflect the relevant market and sectors. As a result, future studies may investigate a larger sample size, such as EGX 100.

Acknowledgment

This research was supported and funded by the research sector, Arab Open University- Kuwait Branch under decision number 21135

References

Abdelrhim M., and Elsayed A., 2020, the effect of COVID-19 spread on Egyptian stock market sectors article, SSRN Electronic journal

Adam T., 2020, how coronavirus almost brought down the global financial system, https://www.theguardian.com/business

ADB, 2020, global cost of coronavirus may reach $4.1 Trillion, ADB, Bloomberg. https://www.bloomberg.com/news/articles/2020-04-03/global-cost-of-coronavirus-could-reach-4-1-trillion-adb-says?srnd=premium-europe (accessed 4.17.20)

AFDB, African development bank, 2016, addressing informality in Egypt, working paper, North Africa policy series, https://www.afdb.org/en/news-and-events/addressing-afdinformality-in-egypt-15567

Ahmar S., and Del Val B., 2020, Sutte ARIMA: short term forecasting method, a case: COVID-19 and stock market in Spain, Sci. total Environ, 729, 138883

Al-Awadhi A., Al-saifi K., Al-Awadhi A., Alhamadi S., 2020, death and contagious infectious diseases: impact of the Covid-19 virus on stock market return, J. Behav, Exp. Finance, 100326

Alber N., 2020, the effect of coronavirus spread on stock markets: the case of the worst 6 countries. SSRN Electron J

Albulescu C., 2020, Covid-19 and the United States financial markets' volatility, finance research letters,

Alfaro L., Chari A., Greenland A., Schott K., 2020, aggregate and firm level stock returns during pandemics in real time, national bureau of economic research

Ali M., Alam N., Rizvi R., 2020, coronavirus (COVID-19) an epidemic or pandemic for financial markets, J. Behav. Exp. Financ., 27, 100341

Asgary A., Ozdemir A., Ozyurek H., 2020, small and medium enterprises and global risks: evidence from manufacturing SMEs in turkey, international

journal of disaster risk science, 11(1), 59-73

Ashraf B., 2020, economic impact of government intervention during COVID-19 pandemic: international evidence from financial markets, behavioral and experimental finance journal, 27, 100371

Ashraf B., 2020a, stock markets' reaction to COVID-19: cases or fatalities? Research in international business and finance, 54,101249

Assem A. H., Lagerkvist C., Esmat A., 2020, risk perception and determinants in small and medium sized agri food enterprises amidst the COVID-19 pandemic: evidence from Egypt, Agribusiness Journal, 37, 187-212

Auzzir Z., Haigh R., Amaratunga D., 2018, impacts of disaster to SMEs in Malaysia, procedia engineering, 212, 1131-1138

Ayadi R., Sessa E., El Said H., Ahmed R., Alshyab N., Sandri S., Ferchichi M., 2017, Micro, small and medium sized enterprises development in Egypt, Jordan, Morocco and Tunisia: structure obstacles and policies, Euro-Mediterranean network for economic studies, 3,1-88

Baldwin, R., & Weder di Mauro, B. (2020). Economics in the Time of COVID-19. CEPR press.

Barberis N., Shleifer A., Vishny R., 1998, A model of investor sentiment, J. Financial Econ., 49(3), 307-343

Bartik A., Bertrand M., Cullen Z., Glaeser E., Luca M., Stanton C., 2020, how are small businesses adjusting to COVID-19? Early evidence from a survey, Harvard Business School Working paper, 20 (102), 1-37

Bary A., 2019 SMEs sector: A key driver to the Egyptian economic development, MPRA paper No. 93034

Beck T., Flynn B., Homanen M., 2020, COVID-19 in emerging markets: firms-survey evidence, https://voxeu.org/article/covid-19-emerging-markets-firm-survey-evidence.

Bennett K., and Phillipson J., 2004, A plague upon their houses: revelations of the foot and mouth disease epidemic for business households, sociologia

ruralis, 44(3), 261-284

Beraha I., and Duricin S., 2020, the impact of COVID-19 crisis on medium sized enterprises in Serbia, economic analysis, 53(1), 14-27

Beutels P., Jia N., Zhou Q., Smith R., Cao W., Vlas J., 2009, the economic impact of SARS in Beijing, china, tropical medicine and intr. Health, 14(1), 85-91

Bikas E., Jureviciene D., Dubinskas P., Novickyte L., 2013, behavioral finance: the emergence and development trends, procedia-social and behave. Sci. 82,870-876

CAPMAS, central agency for public mobilization and statistics, 2018, statistical yearbook, Egypt, www.capmas.gov.eg/Pages/Static_Pages.aspx?page_id=5034

Cardona C., and Serna M., 2020, COVID-19 and oil prices: effects on the Colombian peso exchange rate, SSRN Electron J

CDC, (2021), Centers for disease control and prevention, https://wwwnc.cdc.gov/travel/notices/covid-4/coronavirus-egypt

Chang C., and McAleer M., 2020, alternative global health security indexes for risk analysis of COVID-19, Int. J. Environ. Res. Public health, 17, 3161

CHF MCSE, CHF management and consulting services Egypt, 2020, COVID-19 impact on performance of micro and small business in Egypt, https://www.globalcommunities.org/covid-19-egypt

Corbet S., Hou Y., Hu Y., Lucey B., Oxley L., 2020a, aye corona! The contagion effects of being named corona during the Covid-19 pandemic, Finance Res. Lett., 101591

De Bondt W., Muradoglu G., Shefrin H., Staikouras K., 2008, behavioral finance: Quo Vadis? J. Appl. Financ. 19(2), 7-21

Del Giudice A., and Paltrinieri A., 2017, the impact of the Arab spring and the Ebola outbreak on African equity mutual fund investor decisions, Res. Int. Busi and Financ., 41, 600-612

Dimitriou D., Kenourgios D., Simos T., 2013, global financial crisis and

emerging stock market contagion: A multivariate FIAPARCH-DCC approach, international review of financial analysis, 30, 46-56

Eggers F., 2020, masters of disasters? Challenges and opportunities for SMEs in times of crisis, journal of Business research, 116, 199-208

EGX (2021) The Egyptian exchange, https://www.egx.com.eg/ar/Indices.aspx

Elseoud A., Sayed M., Kreishan M., Ali M., 2019, the reality of SMEs in Arab nations: experience of Egypt, Jordan, and Bahrain, journal of Islamic financial studies, 5 (2)

Fakhry B., 2016, a literature review of behavioral finance, J. Econ. Library, 3 (3)

Fama E., 1965, the behavior of stock-market prices, j. of business, 38(1), 35-105.

Fernandes N., 2020, economic effects of coronavirus outbreak (COVID-19) on the world economy, SSRN Electron. J

Fleming J., Kirby C., Ostdiek B., 2006, information, trading, and volatility: evidence from weather sensitive markets, journal of finance, 61, 2899-29

Guan, Y., Zheng, B. J., He, Y. Q., Liu, X. L., Zhuang, Z. X., Cheung, C. L., ... & Poon, L. L. (2003). Isolation and characterization of viruses related to the SARS coronavirus from animals in southern China. Science, 302(5643), 276-278.

Gujarati, D. N., Bernier, B., & Bernier, B. (2004). Econométrie (pp. 17-5). Brussels: De Boeck.

Gupta, N. (2005). Partial privatization and firm performance. The Journal of Finance, 60(2), 987-1015.

Hale T., Webster S., Petherick A., Phillips T., Kira B., 2020a, oxford COVID-19 government response tracker, blavatnik school of government 25.

Haroon O., and Rizvi R., 2020, Covid-19: media coverage and financial markets behavior- A sectoral inquiry, J. Behav. Exp. Financ., 27, 100343

Ichev R., and Marinč M., 2016, stock prices and geographic proximity of information: evidence from the Ebola outbreak, Int. Revi. Financi. Analysi, 56, 153-166

Kourtidis, D., Šević, Ž., & Chatzoglou, P. (2011). Investors' trading activity: A behavioural perspective and empirical results. The Journal of Socio-Economics, 40(5), 548-557.

Leduc S., and Liu Z., 2020, the uncertainty channel of the coronavirus, FRBSF Econ. Lett

Liu Y., Manzoor A., Wang Y., Zhang L., Manzoor Z., 2020, the Covid-19 outbreak and affected countries stock market response, Int. J. Environ. Res and Public Health, 17(8), 1-19.

Lyócsa S., Baumohl E., Výrost T., Molnár P.,2020, fear of the coronavirus and the stock markets, finance. Res. Lett., 101735.

Macciocchi D, Lanini S, Vairo F, Zumla A, Figueiredo LT, Lauria FN, Strada G, Brouqui P, Puro V, Krishna S, Kremsner P, Scognamiglio P, Köhler C, Nicastri E, Di Caro A, Cieri RM, Ioannidis JP, Kobinger G, Burattini MN, Ippolito G. Short-term economic impact of the Zika virus outbreak. New Microbiol. 2016 Oct;39(4):287-289.

Mazur M., Dang M., Vega M., 2020, COVID-19 and the march 2020 stock market crash, evidence from Sand P 1500, Finance research letters

McAleer M., 2020, prevention is better than the cure: risk management of COVID-19, J. Risk Financ. Manag, 13, 46

Mctier B., Tse Y., Wald K., 2013, do stock markets catch the flu? The journal of financial and quantitative analysis, 48(3), 979-1000

Nippani S., Washer M., 2006, SARS: a non-event for affected countries' stock markets? Applied financial economics,14(15), 1105-1110.

Nozawa Y., and Qiu Y., 2020, the corporate bond market reaction to the COVID-19 crisis, SSRN Electron. J.

Onali E., 2020, COVID-19 and stock market volatility, SSRN Elecron. J.

Phan D., and Narayan P., 2020, country responses and the reaction of the stock market to COVID-19, a preliminary exposition, emerging markets finance and trade, 56 (10), 2138-2150

Prasad S., Su H., Altay N., Tata J., 2015, building disaster resilient micro enterprises in the developing world, Disasters, 39(3), 447-466

Rababah A., Al- Haddad L., Sal M., Chunmei Z., Cherian J., 2020, analyzing the effects of COVID-19 pandemic on the financial performance of Chinese listed companies, J. public Affairs, 2440.

Ramelli S., and Wagner F., 2020, feverish stock price reaction to COVID-19, Electron. J.

Robinson J., and Kengatharan N., 2020, exploring the effect of COVID-19 on small and medium enterprises: early evidence from Sri Lanka, applied economics and business research journal, 10 (2)

Samantha G., 2018, the impact of natural disasters on micro, small, and medium enterprises (MSMEs): A case study on 2016 flood event in western Sri Lanka, procedia engineering, 212, 744-751

Schell D., Wang M., Huynh D., 2020, this time is indeed different: A study on global market reactions to public health crisis, J. Behav. Exp. Financ. 27, 100349

Sènea B., Mbengue M., Allaya M., 2020, overshooting of sovereign emerging Eurobond yields in the context of Covid-19, Financ. Res. Lett., 101746.

Shabir L., Aijaz A., 2020, COVID-19 pandemic, an African perspective, emerging microbes and infections, 9

Shafi M., Liu J., Ren W., 2020, impact of Covid-19 pandemic om micro, small and medium sized enterprises operating in Pakistan, research in globalization,2,100018.

Shehzad K., and Sohail N., 2018, an evidence of calendar effects on the stock market of Pakistan: a case study of KSE-100 index, NFC IEFR J. Eng. Sci. Res. 6, 46-56

Shehzad K., Xiaoxing L., Arif M., Rehman K., Ilyas M., 2020, investigating the psychology of financial markets during Covid-19 Era: A case study of the US and European markets, frontiers in psychology:

doi:10.3389/fpsyg.2020.01924

Statman, M., Fisher, K. L., & Anginer, D. (2008). Affect in a behavioral asset-pricing model. Financial Analysts Journal, 64(2), 20-29.

Sugimoto K., Matsuki T., Yoshida Y., 2014, the global financial crisis: an analysis of the spillover effects on African stock markets, emerging markets review, 21, 201-233

WHO, World health organization, WHO Coronavirus Dashboard, 2020, https://covid19.who.int/

Yilmazkuday H., 2020, coronavirus disease 2019 and the global economy, SSRN Electron, J

Zaazou Z., and Salman D., 2020, Egyptian small and medium sized enterprises' battle against COVID-19 pandemic, humanities and applied social sciences journal, DOI 10.1108/JHASS-09-2020-0161

Zaky M., Dwiarso U., Entot S., Shujahat A., Wajahat G., 2020, stock market reaction to COVID-19: Evidence in customer goods sector with the implication for open innovation, J. Open Innov. Technol. Mark. Comlex, 6 (99)

Zeren F., and Hizarci A., 2020, the impact of Covid-19 Coronavirus on stock markets: evidence from selected countries, bulletin of accounting and finance review, 3 (1), 78-84

Zhang D., Hu M., Ji Q., 2020, financial markets under the global pandemic of COVID-19, Finance res. Let, 101528.https://doi.org/10.1016/j.frl.2020.101528

Zhang,W. & Peng. S. (2016). Analysis on CO_2 Emissions Transferred from Developed Economies to China through Trade, China & World Economy, Vol. 24 (2).