

T.C.
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SOSYAL BİLİMLER ENSTİTÜSÜ
İŞLETME (İNGİLİZCE) ANABİLİM DALI
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**THE IMPACT OF CORONAVIRUS PANDEMIC ON STOCK MARKETS:
EVIDENCE FROM JORDAN**

Yüksek Lisans Tezi

SARA JAMIL MAHMOUD ALBATAYNEH

İSTANBUL, 2022

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Danışman: DR. ÖĞRETİM ÜYESİ MEHTAP ÖNER

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ÖZET

KORONAVİRÜS PANDEMİSİNİN BORSALAR ÜZERİNDEKİ ETKİSİ: ÜRDÜN ÖRNEĞİ

COVID-19 pandemisi dünya çapında birçok endüstri ve ülkeyi şiddetli biçimde etkilemiştir. Küresel finans piyasalarında hemen hemen her türlü ticari faaliyeti etkileyen COVID-19'un özellikle borsalar ve hisse senedi getirileri üzerinde de etkili olduğu gözlemlenmiştir. Bu çalışma ile yeni koronavirüs pandemisinin Ürdün Borsası üzerindeki etkisini ortaya çıkarmak amaçlanmıştır. Çalışmada Amman Borsası'nda Sınai, Hizmet ve Finansal Endekslerde listelenen 16 alt endekse ait veri seti Ürdün'ün borsa getirisini temsilen kullanılmıştır. Yöntem olarak panel veri metodolojisinin kullanıldığı bu çalışma, Amman Borsası'nın pandemi nedeniyle 50 günlük bir kapatmanın ardından ticari faaliyetlerine yeniden başladığı 10 Mayıs 2020 ile aşılardan ilk kez Ürdün'e ithal edildiği 12 Ocak 2021 arasındaki dönemi kapsamaktadır. COVID-19 göstergesi olarak Ürdün ve dünyadaki yeni COVID-19 vaka sayılarındaki haftalık artış ile dünyadaki COVID-19 kaynaklı ölüm sayılarındaki haftalık büyüme oranı kullanılmıştır. Bulgular, Ürdün'deki haftalık yeni COVID-19 vaka sayılarındaki artışın seçili endeks getirileri üzerinde istatistiksel olarak anlamlı bir etkisinin olmadığını göstermiştir. Bununla birlikte dünyadaki vaka sayılarındaki haftalık artışın ise hisse senedi getirilerini olumsuz etkilediği gözlemlenmiştir. Diğer taraftan beklentilerin aksine dünyada COVID-19 kaynaklı yeni ölüm sayılarındaki haftalık artışın seçili endeks getirileri üzerinde pozitif etkiye sahip olduğu ortaya çıkmıştır. Kontrol değişkenlerine ilişkin ilave bulgular ise Volatilité Endeksi (VIX)'nin seçili endeks getirilerini istatistiki olarak anlamlı bir şekilde negatif yönde etkilediğini göstermiştir. Ancak petrol fiyatlarının getiri üzerinde anlamlı bir etkisi gözlemlenmemiştir.

Anahtar Kelimeler: COVID-19, Pandemi, Ürdün Borsası, Endeks Getirisi, Panel Veri Analizi.

ABSTRACT

THE IMPACT OF CORONAVIRUS PANDEMIC ON STOCK MARKETS: EVIDENCE FROM JORDAN

The COVID-19 pandemic has severely affected many industries and countries around the world. It has been observed that COVID-19 which affects almost all types of business activities in the global financial markets, has also affected stock exchanges and stock returns. This study aims to investigate the impact of the novel coronavirus pandemic on Jordanian stock market. The dataset consists of 16 subindices from Industrials, Services, and Financial indices in Amman Stock Exchange (ASE) to represent stock return in Jordan. This study which utilizes the panel data methodology, covers the period between 10 May 2020, when trading activity was resumed in the ASE after a 50-day closure due to the pandemic, and 12 January 2021, when the vaccines are firstly imported to Jordan. The growth in number of weekly COVID-19 confirmed new cases for Jordan and the world together with the the growth in number of weekly COVID-19 confirmed new deaths for the world are used as proxies for the novel coronavirus. The evidence indicates that there is no statistically significant relationship between growth in the number of COVID-19 new cases and stock returns in Jordan. However, it is founded that the growth in number of COVID-19 new cases in the world negatively affect the stock returns in Jordan. On the other hand, contrary to expectations it is observed that the growth in number of COVID-19 new deaths in the world has positive impact on index returns of Jordan. Further findings as to the control variables show that the Volatility Index (VIX) has negative significant impact on selected index returns. However, any significant relationship has been founded between oil prices and selected index returns of Jordan during the study period.

Keywords: COVID-19, Pandemic, Amman Stock Exchange, Index Return, Panel Data Analysis.

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SARA JAMIL MAHMOUD ALBATAYNEH

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LIST OF ABBREVIATION

Abbreviation	Meaning
ASE	Amman Stock Exchange
CBJ	Central Bank of Jordan
CDS	Credit Default Swap
COVID-19	Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)
GDP	Gross Domestic Product
GCC	Gulf Cooperation Council
IMF	International Monetary Fund
JD	Jordanian Dinars
JSC	Jordan Securities Commission
JSF	Jordan Strategy Forum
OECD	Organisation for Economic Co-operation and Development
SMEs	Small and Medium-size Enterprises
UNDP	United Nations Development Programme
US	United States
VIX	Volatility Index
WHO	World Health Organization

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1. INTRODUCTION

The world has witnessed many epidemics and crises from ancient times until the present, which negatively affected a large part of the world at the economic and social levels. Currently, the novel coronavirus pandemic is the undisputed major crisis of the twenty-first century so far, casting a strong shadow over all of humanity, individuals, societies, institutions, and governments. The COVID-19 pandemic has created an unprecedented humanitarian and health crisis, as the measures necessary to contain the virus have caused an economic downturn. There is a significant degree of uncertainty at the moment about how severe and for how long. The global statistics of the World Health Organization (WHO) indicate that the number of confirmed cases had reached on July 01, 2022, more than 545,226,550 and more than 6,334,728 confirmed deaths.

Unexpected events have made forecasting performance and economic impacts difficult, due to the lack of robust multi-dimensional, comprehensive forecast models for the pandemic that can be used to predict future performance, depending on the global nature of the pandemic and its duration. The measures imposed by the governments of countries to prevent the outbreak of the COVID-19 made it difficult for decision and policy makers to formulate an appropriate response to macroeconomic policies, which plunged the world into a devastating economic crisis that led to a sharp contraction and a slowdown in global growth. Business owners were affected by stopping commercial activities, restricting transport between countries, disrupting supply chains, and reducing their ability to pay their obligations due to the low liquidity, which led to the loss of many workers and their jobs, and thus high unemployment rates. The volatility of global financial markets increased credit risks, and drop in investor confidence. Significant constraints on all main sources of funding contributed to a reduction in finance available, including outflows to emerging economies, an increase in low-rated credit, and an increase in credit-related loans.

Despite the production of the coronavirus vaccine at the beginning of 2021 and giving it to a large proportion of people, together with the willingness of many countries to develop comprehensive recovery plans and structural strategies for adapting to a normal life after the pandemic, this requires coordinated international cooperation to create more favorable conditions for dealing with the crisis effectively, organizing strategies to ensure innovative development and supporting economic development and

efficiency. Concerns still exist due to the uncertainty in the behavior of the virus, the continuity of the pandemic, and the inability of governments to estimate all the effects and losses incurred due to it.

The recent outbreak of the disease caused a global economic crisis that made it more difficult for policymakers to formulate an appropriate response to macroeconomic policies. However, governments imposed measures to prevent the spread of the virus to restrict transportation, social distancing, and supply chain disruptions due to the slowdown in the Chinese economy, which resulted in production contractions for the companies depending on China's input. Moreover, it halts many business activities, creates panic and changes consumption patterns for all consumers and businesses in the market, which slowed global growth (McKibbin, Fernando 2020). The commercial collapse of the current crisis follows a gradual pattern that reflects the changing geographical center of the pandemic, starting from Asia to Europe, and then to the United States (US) and Latin America. The asymmetry in economic shocks between countries resulted in unpredictable real gross domestic product (GDP), disruptions in supply and demand chains, transportation restrictions, high unemployment rates, and massive job losses, called on governments to take immediate remedial measures to recover all sectors and to mitigate the disproportionate impact on countries, business sectors, and supply and demand chains (Rakha et al. 2021).

The outbreak of the coronavirus also affected the global financial markets. The dynamic conditional correlations increased significantly during the pandemic, which led to an increase in hedging rates and costs, increased market and credit risks for international investors due to the mismatch of currencies in portfolios, and increased costs of the most important hedge in the stock market. This prompted market participants to reduce their ability to take risks and discourage growth in both financial markets and global economies. Financial companies play a more important role in the transmission of financial contagion than non-financial companies. These results help investors improve their investment portfolios and guide policymakers and regulators to continue to provide liquidity to international markets. Thus, official announcements related to new cases of coronavirus infection effects amplify the fluctuations of the financial markets, and the death rates positively affect the fluctuations of financial markets that the longer the duration of the COVID-19 pandemic, the greater challenge it poses to the activity of managing risks and fluctuations in the financial markets (Akhtaruzzaman, Boubaker, Sensoy 2021).

Furthermore, the COVID-19 pandemic has caused unprecedented severe turmoil in the currency, bond, and commodity markets for stock market returns and economic activity. It affected the links and behaviors in the financial market, and the Volatility Index (VIX) which refers to the level of anxiety and fear in stock markets rose to higher than the levels of global financial crisis 2008. Some sectors reacted in several

ways to the pandemic revenue shock during cost cuts and witnessed severe asymmetric volatility that was negatively correlated with stock returns in some losing stock sectors (petroleum, real estate, entertainment, and hospitality). While the shares of other sectors achieved high positive returns like natural gas, food, health care, and software sectors (Mazur, Dang, Vega 2021; Ciner 2021).

The outbreak of the COVID-19 pandemic was caused by the SARS-CoV-2 virus that appeared in Wuhan city in Hubei province of China, for the first time on December 12, 2019 and later spread to the rest of the world causing a state of terror for the entire world. At the beginning of the period of the COVID-19 pandemic, governments took preventive measures to alleviate the health crisis caused by the coronavirus as comprehensive closure of all facilities, the suspension of commercial activities, and the quarantine. Even the negative effects of the preventive measures and the damage they caused were common for both developed and developing economies around the world, the biggest damage was pronounced for the emerging economies due to their scarcity of resources and the lack of readiness of the infrastructure for such a pandemic and the necessary modernization and restructuring of business management during the period of the COVID-19 (Caballero-Morales, 2021:1).

From the health crisis to a global crisis, the risks of the pandemic have outpaced the coronavirus, which led to a decline of over 30% in stock markets, higher volatility in stocks and oil, sharply widening credit spreads on non-investment debt, a rise in low-rated credit and the growth of leveraged loans to a slowdown in bank lending. The consequences of the coronavirus pandemic resulted in a 700 billion US dollar decrease in available sustainable development financing and external flows to developing economies in 2020 compared to 2019 levels (OECD 2020c:1; OECD, 2020a:2).

The Hashemite Kingdom of Jordan has been also affected by the virus and recorded the first case with the coronavirus on March 2, 2020 for a citizen coming from Italy 16 days ago. The first death caused by the coronavirus pandemic was reported in Jordan on March 28, 2020, according to the Ministry of Health Jordan (2022). 1,696,937 cases and 14,066 deaths have been recorded between the beginnings of the pandemic to July 01, 2022, respectively. Even the global economy and financial market are affected significantly by the virus; the aim of this thesis is to evaluate the impact of COVID-19 pandemic on the Jordanian stock market. The government in coordination with the Jordan Securities Commission (JSC), suspended trading and closed the Amman Stock Exchange (ASE) for 50 days from the date of March 17, 2020, in light of the measures taken by the government to confront the repercussions of the coronavirus, the closure of economic sectors and the comprehensive closure, which made it lose 17% of its market

value and the level of confidence declined until trading was resumed on the ASE on May 10, 2020 (JSC, 2020).

This study aims to investigate the impact of the COVID-19 pandemic on the stock market return of Jordan with data covering the period between 10 May 2020, when activity was resumed in the ASE after a 50-day closure due to the pandemic, and 12 January 2021, when the vaccines are firstly imported to Jordan. The main methodology of the study is panel data analysis. The selected sub-indices listed on ASE will be used as a proxy for stock market return. Index returns which will be calculated from closing index values will stand for the dependent variable of the analysis. On the other hand, the growth in number of confirmed COVID-19 new cases for Jordan, growth in number of confirmed COVID-19 new cases and death for the world, which are proxies for COVID-19, will be used as explanatory variables of the analysis.

2. THE IMPACT OF UNEXPECTED EVENTS ON FINANCIAL MARKETS

An unexpected event is any act or circumstance out of control such as natural events (floods, earthquakes, hurricanes, fires...etc.), pandemic diseases, government restrictions, or terrorism. A crisis like the great depression of 1929 and the global financial crisis of 2008 affected the global economy negatively, caused a sharp contraction in global GDP, and increased the unemployment rate, and affected consumer spending and investor confidence. It affected the financial health and increased the volatility of the financial markets and caused a decrease in liquidity due to the increase in investors' fears which resulted in, high turmoil in global stock exchanges, a decrease in aggregate demand, and also decrease in the total number of traded shares and return in the stock market.

Pandemics and famines, not wars, are the biggest and most deadly killing factors in the history of humanity and the world. Many pandemics have occurred throughout the history and changed the route of global economic operations with the emergence of the term globalization, which mostly lead to increase in dominance of the developed economies. According to the World Health Organization (WHO), the pandemic is defined as a state of the spread of a specific disease in which the number of cases is greater than what is expected in a specific community and a geographical area, a season, or a period that may last for several days or weeks and may last for years (WHO, 2020).

Catastrophic events of geological origin like earthquakes have also repeatedly impeded global economic development and affected regional markets (Skufina et al. 2019). It is estimated that wars during the twentieth century killed about 160 million people. In contrast, the global influenza of 1918-1919 (Spanish Influenza) killed 50 million people worldwide and cost more than \$4 trillion, which is three times the number of deaths in World War I in the same period. Famines in the twentieth century also killed between seventy and one hundred million people. It is important to state that, viruses and pandemics kill more people every year than wars and military conflicts. Severe acute respiratory syndrome (SARS), the first pandemic that spread in the 21st century (2002-2003); appeared in Guangdong Province in southern China, causing the death of more than 800 people, and its genetic makeup is almost 90% similar to that of the last pandemic COVID-19. The cost of SARS to the global economy was \$54 billion according to the World Bank. Ebola outbreak occurred in Africa between 2013 and 2016, resulting in 11,300 human deaths and \$53 billion loss from the economy in West Africa.

The following sub-sections will present two important events as an example for the unexpected events in the financial markets, namely; Great Depression of 1929 and Global Financial Crises of 2008, respectively.

2.1 The Great Depression (1929)

The Great Depression was occurred in 1929 in the US and kept going for ten years approximately until 1939. It was the longest depression and the worst economic downturn in post-industrial world history and the most serious crisis in American history. The causes of the Great Depression were attributed to monetary factors, as it began after the collapse of the financial markets in October 1929; which pushed the stock market on Wall Street to a state of panic that harmed millions of investors. It led to decrease in rate of consumer spending's and investments together with financial panic and misleading government policies which led to decrease in economic output in the US. Money supply, production, and prices all fell sharply in the deflationary period and rose rapidly in the recovery period because monetary policy works largely through its effect on the real supply of bank credit and the flexibility of prices can be devastating if they take the form of unexpected deflation. The monetary and non-monetary forces were active in different stages of the crisis; the correlation of money and low prices with lower production in each country reflects the effect of money on the real economy. The Federal Reserve tried to compensate for the decline in open market operations and loans to banks through the discount window, but its policies failed and turned into a sharp contraction in business activity, and the reason for the failure of its policies was likely to change the leadership within the Federal Reserve. While some governments attempted to abandon the gold standard early in the 1930s in response to the severe recession, they were able to reverse their cash supply and price levels and recover from the depression more quickly than the governments of the remaining gold-standard countries, which increased their crushing deflation (Bernanke, 1994). Financial markets are important source in explaining the origins and continuation of the Great Depression coinciding with previous events in the financial markets such as the stock market crash, waves of bankruptcy, bank failures, and the shrinking of the stock of money. According to some, the origins of depression are due to external changes in the money supply, and the measurement of aggregate supply and demand, which is important to create a difference in the gross national product. Cause disruptions in it affect production, excess capacity, unemployment, and continuous reductions in the efficiency of capital allocations through internal changes in corporate budgets, consumers, technology, and the combination of financial influences an individual faces (Calomiris, 1993).

The Great Stock Market Crash (The Great Crash) of 1929 was a completely separate event from the Great Depression, in which the stock market collapse arose due to the tight American monetary policy that is set to reduce and regulate speculation in the stock market, which began with an initial contraction in production and employment in the US with a decline in US stock prices with reasonable expectations of earnings, which lost investors' confidence and the stock market bubble burst. The state of panic selling began because investors lost their confidence in October 1929, which was called "Black Thursday." The stock market was the clear rise area, with stock prices rising more than four times from their lowest level in 1921, which created stock market instability and prompted the aggravation of stock price declines. Some investors are selling their holdings as a result of buying too many stocks on leverage, while real output in the United States has declined as a result of a major drop in aggregate demand, as well as fewer consumer purchases of durable goods and corporate investment. The Fed's response to the stock market crash was devastating by raising interest rates to slow the rapid rise in stock prices because it was negatively reflected in lower production due to the disordered behavior of investors and consumers by lower interest-sensitive spending in areas such as construction and auto purchases. The US response to the recession and declining GDP caused by the Great Depression, instituted state pensions and the Social Security Act of 1935 to compensate and secure old age and survivors' insurance, as trade union membership doubled due to severe unemployment. The US created the Securities and Exchange Commission (SEC) in 1934 to regulate the issuance of new shares and trading practices in the stock market, the Banking of (Glass-Steagall Act) 1933 also established deposit insurance in the US and prohibited banks from underwriting or dealing in securities (Romer, 2003).

The theory of Professor Nassim Nicholas Taleb a finance professor, writer, and former Wall Street trader says that it is impossible to predict the events of the black swan and its catastrophic repercussions. It means that the black swan event is rare and has serious consequences and cannot be predicted in advance. Moreover, its events cause catastrophic damage to the economy with the widespread insistence that it was clear in hindsight, as history is full of unexpected and unprecedented events that no one had ever thought were possible. For example, in the 1918 flu outbreak, and the great depression in 1929, the theory proves that just because nothing will happen does not mean that it will not happen. Just because unexpected and rare events happen, it is impossible to mitigate their enormous repercussions. This issue is also what we can call the COVID-19 in 2019, the black swan theory, but it does not meet all the criteria of the theory. The coronavirus pandemic is unexpected, but a not rare event, as history is full of such events and the disruptions and economic repercussions they caused, and the huge losses that required a radical change in the policy structure to enable the economy to recover in the long term and continue in the post-COVID-19

world. But if we look at the past, the COVID-19 appears to be a familiar occurrence, the danger does not lie in the turmoil it has caused in the long term, but the danger lies in rejecting the inevitability of the COVID-19 pandemic, enabling us to reject the occurrence of epidemics in the future and the need to prepare better (Gillivray 2020; Taleb 2007).

2.2 The Global Financial Crisis (2008 and Early-2009)

The global financial crisis was started in the US economy which is the growth engine of the global economy. It was caused by the mortgage collapse crisis that has struck the global economy as a whole starting from August 2007, and the problems spread quickly to the American banking sector and the international financial system as a whole. It is considered to be one of the most violent global economic crises after the Great Depression that began with the collapse of the US stock market on October 29, 1929. The global economy witnessed devastating turmoil and the shrinking of the global gross domestic product. Moreover, the trade and labor market witnessed a significant contraction and the number of unemployed people increased in the European Union countries (Jickling, 2009). The global financial crisis has been defined as a defect or disorder in the financial systems (Mishkin, 1992). Despite the growth in the market for subprime mortgage loans with flexible and changing interest in the US financial markets, as well as the continued expansion and increase in lending operations with high credit risks without the capital to cover their risks and a lack of transparency in the disclosure of detailed information. The capacity to continue lending operations and enhance profits while ignoring the significant risks involved, according to the researcher, helped in the eruption of the financial crisis owing to a substantial deficiency in the liquidity of banks and financial lending organizations. The transparency of the disclosure of information related to mortgage assets and financial derivatives was not sufficient to assess the credit status of companies and banks. This helped to exacerbate the crisis, its expansion, and lack of control over it. As a result, insurance companies were unable to cover insolvent debts for all of their clients (Barth, Landsman 2010).

Following the failure of some financial institutions and the complete evaporation of liquidity, some sectors and governments have taken several emergency liquidity measures, such as the Federal Reserve acting as an intermediary in the acquisition of an American investment bank (J.P. Morgan) on its troubled competitor (Bear Stearns), and the rescue of the Federal Reserve, the largest insurance company in the United States. The European Central Bank supplied roughly 100 billion euros in short-term financing to banks in Eurozone markets, while the German government bailed out a commercial real estate lender in the US (Hypo Real Estate). While the government was unable to find a solution to save Lehman Brothers,

which collapsed at the end of 2008, Fortis Inc.'s rescue plan also failed and was scrapped, and the intensification of financial integration in the European Union (EU) and the merger of many banks across borders complicated the rescue of European banks during the crisis. Regular and conventionally regulated financial organizations' regulatory failings stem from their disregard for minimum capital requirements and broader risk assessment in pursuit of more profitable but high-risk trading techniques (Hodson, Quaglia 2009).

The effect of long-term debt maturities in both high and low risk companies has been analyzed and found that the risks of extending the debt maturity period on asset prices had an impact during the peak period of the financial crisis. The government tried to pump millions of dollars with the purchase of part of the shares of companies and banks to enable them to repay the loans, but it did not help. When the main concern of the Federal Reserve was inflation, financial stability became influential on the whole world economies (Hu, 2020). During the fourth quarter of 2008, international trade flows dropped. As a result, exports from financially weak industries were more sensitive to the cost of external capital than exports from less weak industries, resulting in a 12% fall in global trade flows in 2009, according to a World Trade Organization report (WTO). This resulted in a dramatic drop in private exports in the tiny open economies. Countries that were not immediately affected by the mortgage crisis saw a severe recession and a rise in the unemployment rate. Due to the downturn, recession, and constrained exports, large manufacturers throughout the world have curtailed output and employment (Chor, Manova 2012).

The effects of global financial crises on the markets and their stability vary in many countries around the world. During the current crisis, compared to the previous three crises, it became clear that market factors cannot adequately explain the joint movement of stock returns, and that stock returns are interdependent with market factors (So, Chu, Chan 2021).

Among the reasons of the crisis were American military fighting in wars such as Somalia and Iraq, spending three trillion dollars, and neglecting the mortgage issue. Similarly, the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD) failed to meet the basic objectives for which they were established, such as the unregulated practices of US banks' excessive expansion and the housing policy. Banks have focused on mortgage default risk since they have circumvented regulatory capital requirements by temporarily storing assets and enabled them to decrease necessary capital against assets and loans on their balance sheets (Acharya, Richardson 2009). From my perspective, the banks and American lending institutions are to blame for this crisis, as are the people who took loans without paying attention to the terms of the contracts and the clause of changing the interest

rate, as the contract included provisions that make the installment rise with the length of the period and when not paying one time, the interest of the installment is taken three times for the month that was not completed Repayment and policies

Unexpected black swan events like epidemics and economic restrictions have damaged global financial markets for a long time. Globalization, economic openness, and international commerce are all contributing to the spread of infectious illnesses and related expenses. While some compared the coronavirus pandemic to a political and economic battle, others compared it to terrorist acts, natural catastrophes, previous epidemics, and a black swan. The black swan was compared to the idea that no such crisis happened and that its existence was not previously foreseen, making current risk models more difficult to effectively estimate the effects of the COVID-19 pandemic. Others argue it is not a black swan because comparable occurrences in the past, such as the 2008 global financial crisis, and its impact on the economy of similar countries, have occurred (Yarovaya, Matkovskyy, Jalan 2020:1).

3. LITERATURE REVIEW

On the spread of the pandemic and its transformation from a health crisis to a global economic crisis, COVID-19 led to the deterioration of many sectors due to the containment measures imposed by governments on all commercial and social activities. The procedures were taken by governments to prevent the outbreak of the disease resulted in severe disruptions in transportation, services, and manufacturing industries, and high unemployment rates, which led to the global economy entering a severe recession due to the massive shock, which called for international measures to speed up the protection of economic prosperity (Pak et al. 2020). While the first case was seen on December 31, 2019, in Wuhan, China; the instability in China has shifted to other major stock indexes of countries, especially to the Europe. The number of cases and deaths spread rapidly and escalated to other countries, which had a negative impact on stock returns of some companies. The WHO declared it as a global crisis which requires taking comprehensive closure measures for all sectors at the beginning of the disease's spread. This chapter will provide a literature review of the impact of COVID-19 on global economy, financial markets, and stock markets together with its negative and positive effects and consequences for different industries and countries. Moreover, the studies related with the impact of COVID-19 on Jordan economy will also be summarized with up to date numbers.

3.1 The Impact of COVID-19 on the Global Economy

The unexpectedly rapid spread of the 2020 coronavirus disease (COVID-19), encouraged the global economy to enter the most severe and profound contraction of global GDP in the history of capitalism. It put policymakers under great pressure to respond to the virus outbreak and apply appropriate macroeconomic policies. Many governments have taken measures to confront the pandemic. They set restrictions which caused negative and positive effects; such as imposing restrictions on social distancing, closing most sectors which led to reduction in the level of economic activities, restricting transportation between countries, and causing great damage to related sectors, and disruptions in the international supply chain. Some governments have also taken advantage of the health crisis caused by the COVID-19 pandemic to fix the deficiencies in their health care systems, financial systems, and economic conditions.

The COVID-19 pandemic is one of the biggest challenges we have faced in our time since World War II. The virus has spread to all continents of the world except for Antarctica and countries have implemented precautionary plans to slow the spread of the virus through quarantine measures, restrictions

on travel between countries and canceling events large gatherings of people. The impact of the coronavirus has moved from a global health crisis to a devastating global economic crisis that can leave deep scars. The International Labor Organization (ILO) has stated that 25 million jobs could be lost due to the COVID-19 pandemic, which emphasizes the need for immediate action by all countries and international organizations (UNDP, 2020).

The spread of the coronavirus has caused major economic disruption around the world. Due to the closure of many sectors to prevent the spread of the virus, the decline in stock prices, the collapse in some sectors, and the suspension of some sectors, the production contractions in China affected all economies of the world and economies that are closely related to China in 2020, such as Japan and Australia, which negatively affected confidence, financial markets, demand, and production lines. The expected yearly growth rate of the world gross domestic product has been reduced to 2.4 percent, with global growth of 1 percent in 2020, half of what was expected before the coronavirus pandemic (OECD, 2020b:3).

The whole world is still suffering from the repercussions of the COVID-19 pandemic which affected international trade and all forms of life activities. Therefore, it is necessary to look at how to take advantage for moving towards a more flexible economy to achieve the goals of sustainable development, restructuring the dynamics of our way of life, and preparing a new economic and social growth model that is more sustainable and flexible within a circular economic framework. The COVID-19 pandemic led to a 14% dive in world trade by April 2020 that current trade recession appears to have a sharper ‘V-shape’, with a stronger collapse but a quicker recovery than the previous crises of world trade contractions (Ibn-Mohammed et al. 2021:1; Meijerink, Hendriks, Bergeijk 2020).

Government-imposed preventative measures since the coronavirus pandemic have resulted in a decrease in overall supply and demand, as well as a fall in manufacturing capacity and supply chains in China, damaging the sector industry and manufacturers worldwide. Following outbreak the coronavirus pandemic and the cumulative decline in cases and deaths in China, the Chinese government began to take procedures to gradually return to normal life, open-closed sectors, and operating sectors, allowing Chinese industry to recover its high production volume (Baldwin, Di Mauro 2020).

The disruption of the Chinese economy and global supply chains caused by the coronavirus pandemic has made it more difficult for policymakers to develop suitable reactions and plans for macroeconomic recovery policies. In the midst of global turmoil, all companies, regardless of size, have faced significant production contractions, a further slowdown in global economic activities, disruption in consumer consumption patterns, and restrictions on transportation between countries to prevent the spread of the

virus, creating an anomaly in the market and affecting financial markets and global stock indices, which fell with low investor confidence (Mckibbin, Fernando 2020: 1-2).

The COVID-19 pandemic has wreaked great devastation on human life and the economies of nations. Many people have lost their lives and sources of income as a result of government restrictions and measures put on the activities of individuals and businesses in order to stop the spread of the virus. The study emphasized that the restrictions and protocols imposed by countries as a solution to limit the spread of the COVID-19 are the cause of the losses that we have seen in commercial operations since the beginning of the pandemic, and the virus is still killing people and there is no cure for it so far (Gerald, Obianuju, Chukwunonso 2020:4).

SMEs constitute the backbone of the European economy, 99.8% of all enterprises and two-thirds of employment. The coronavirus attack was a virus-like economic shock as the impacts of the crisis were categorized into immediate short-term effects resulting from near-simultaneous shutdowns across Europe and its trading partners, logistical challenges faced by SMEs, and demand disruptions. In the long term, there will be different challenges and opportunities depending on the type of SME, so policy interventions must be sensitive to different types of companies and adopt an approach that suits all European SMEs and mix policies that focus on a more structural approach to the survival and continuity of companies in the long term and promote their renewal and growth through innovation, internationalization, and communication (Juergensen, Guimón, Narula 2020: 1-2).

The global medical, health and economic consequences of the COVID-19 pandemic made it more difficult for policymakers to develop complete policies, procedures, and models suitable for the whole economy. Because it is a global challenge, international cooperation is required. To deal with it effectively and to create new types of interventions and how to better them, because we live in a much linked world, and these disruptions affect the economy of all countries (Susskind, Vines 2020:1).

A study was conducted on the impact of restrictions and closure imposed by the Chinese authorities on the commercial activities of SMEs during the period of the COVID-19 pandemic in the short and medium-term. The evidence indicated heavy losses due to the importance of SMEs which is considered to be main generator of job opportunities and contributor to local production. As the SMEs companies surveyed, the challenges they faced during the first wave of the COVID-19 showed, that their production operations were halted and disruptions in logistics services were occurred. Moreover, labor mobility due to the imposed restrictions increased and a decrease occurred in external demand and cash flows of export companies. But after the government curbed the virus, it eased the imposed restrictions and reopened

commercial activities and closed sectors, but under strict conditions to prevent the spread of the virus among people. Nevertheless, the impact continues on the SMEs and faces a fundamental challenge; the decline in demand. However, the governments apply some policies to support the SME business, such as postponing fees, lending facilities, and extending the grace period for repayment of loans and taxes (Dai et al. 2021: 1-2).

One other earlier study that was conducted on SMEs in China to find the effect of government policy measures imposed during the COVID-19 pandemic on SMEs is that of Chen et al. (2020: 1-2). They found that the policies of stabilization through exemptions and delays in payment work to improve the cash flows of SMEs and stimulate their operational recovery more. Also, local regional closure policies for companies' activities reduce consumer demand for their products, and thus the financial support policies have not shown effectiveness in easing the cash restrictions for companies due to the reasons for the difficulty in accessing loans and misallocation of credit.

Another study conducted to evaluate the impact of COVID-19 on SMEs can be given for Russia. The Russian government aimed to create more favorable conditions to organize strategies to ensure the innovative development of the Russian economy and its structural diversification by evaluating the effectiveness of government policies in supporting the development and economic efficiency of SMEs in light of the spread of the COVID-19 pandemic. SMEs constitute 60 percent of the GDP of developed countries, and it is characterized by innovation and ensuring the emergence of permanent new jobs when compared to large businesses. (Razumovskaia et al. 2020:1). The COVID-19 pandemic has also affected many aspects of the US economy, as classified the adaptation of small businesses during the COVID-19 in different ways, some by reducing the number of working hours, others by reducing employment, and fewer by changing the goods and services they produce (Buffington et al. 2020: 16-20).

Countries around the world have been affected from the novel coronavirus pandemic at different levels based on their economic powers. For example, most of the companies in Pakistan have been hit hard during the COVID-19 pandemic as they faced many financial problems such as lower demand, lower sales, lower profits, disruption of supply chains, cancellation of export orders, shortage of raw materials, and transportation disruptions. In addition, 84% of companies did not have plans and readiness to face the COVID-19, and two-thirds of companies will not be able to survive for a long time compared to large companies because they do not have sufficient financial and managerial resources, their dependence on routine business transactions, and their limited inventory (Shafi, Liu, Ren 2020:1).

While the rapid spread of the COVID-19 led to a slowdown in the global economy it has also effects on Jordan's economy in which it resulted in the impediment of foreign direct investment, remittances, trade, and tourism, and the closure of many companies facing a liquidity crisis that made many workers lose their jobs. The Jordanian government implemented strategies to control public finances and the massive downturn caused by the coronavirus pandemic through issuing two-tranche international bonds at competitive interest rates, and directing emerging technology companies to facilitate commercial activity in the region, also entering into global supply chains to turn the ordeal into an opportunity by producing medical masks and their export, which contributed to enhancing confidence in Jordan's economy (IMF, 2020).

Jordan experienced economic and political issues following the spread of the COVID-19, which aggravated the state's situation with dangerous levels of poverty, high unemployment, decreasing foreign remittances, dropping revenues, declining GDP, and the loss of GCC financial help. The administration tried to anticipate popular demands for political reforms through its special pandemic security policy, which relied on the state's police and army. Following the announcement of the first coronavirus infection, the government declared a state of emergency and imposed a comprehensive closure of all commercial activities, sectors, transportation, and people's movement for nearly three months, with the army delivering food and health supplies to people. These stringent restrictions put citizens under psychological and economic strain and reduced family earnings. This prompted the government to devise measures to reopen various sectors and commercial activity following the relative drop in the number of confirmed coronavirus cases, in order to alleviate the disruptions and expenditures suffered during the crisis (Badarin, 2020).

The Jordanian government has followed a series of preventive strategies at the local and national levels to limit the spread of COVID-19. On March 17, 2020, the government announced the implementation of the defense law and curfew at the state level and imposed strict rules and measures such as stopping travel, education, religious and social events, closure of sectors and commercial activities to maintain social distance and restrict movement people and the imposition of quarantine on those coming from outside the country. Which put decisions and policymakers in great challenge and uncertainty in the behavior of the virus and transmission of infection due to the lack of a vaccine for the virus at the beginning of the pandemic and the sudden change in lifestyles and economic damage, and the development of strategies to adapt to the preventive measures of the pandemic after the closure as a new normal way of life (Al-Tammemi, 2020:5).

The timing in implementing strict measures, implementing a nationwide curfew, closing all entry borders to the country, and imposing a mandatory 14-day quarantine for all arrivals in the early stages of the spread of the COVID-19 is extremely important in a country with limited resources like Jordan. The speed in implementing preventive measures enabled the state to reduce the relative rate of infection with the virus and control the epidemiological situation compared to other countries. The factors are demographic characteristics, precautions taken, a general commitment to instructions and packages to implement measures, public awareness of the disease and national vaccination programs are decisive and important factors in reducing the number of new confirmed cases of the pandemic COVID-19. Despite the World Bank's classification of Jordan as a middle-income country, preventive measures to contain the virus affected the country's economy due to the increase in the unemployment rate, the decrease in household incomes, the impact on public mental health, and the decline in GDP (Khatatbeh, 2020).

The Jordanian economy experienced a sharp slowdown as a result of the preventive measures established by the government to prevent the spread of the COVID-19 pandemic, as the government issued a defense decision, a curfew, and the closing of the Kingdom's borders, which affected the tourism sector. The complete shutdown of all corporate activity made it difficult to retain personnel, pay wages, and decreased demand for numerous goods and services, resulting in a loss in tax revenues, a 19 percent increase in the unemployment rate, and a fall in worker remittances. Government policies exacerbated ethnic tensions, increased restrictions on freedom of expression, led to arrests of journalists, violations of privacy, and undermined confidence inside communities increasing the sense of marginalization. The COVID-19 pandemic has increased the burden of human and financial costs on the overall Jordanian economy due to its limited resources due to the expansion of the health system capabilities and costs in terms of human resources, the capacity of hospitals and laboratories, information management, monitoring requirements, and securing large quantities of coronavirus tests, which greatly increased public spending on health, network, social safety, liquidity injections, and basic aid to ease the outbreak of the virus and massive turmoil (United Nations, 2020).

The SMEs in Jordan has also affected by COVID-19 which play an important role in the economy and contribute nearly to 30% of the GDP and constitute more than 99.5% of the total enterprises operating in various economic sectors, according to Jordan Chamber of Industry (2021). Support and develop the necessary measures to mitigate the effects of the COVID-19 pandemic on companies and their workers due to the great challenges that these businesses face, such as liquidity and low demand and supply of products for the importance of SMEs business in contributing to increasing the gross domestic product.

Therefore, the United Nations (UN) recommended the comprehensiveness of the strategic plans put in place to revive the economy for the micro and small businesses, and that they are supported to facilitate the continuity of their business and not collapse, increase their financial flexibility and adapt to the changing reality during the current conditions for the long term (Kebede et al. 2020:12).

SMEs in Jordan was greatly affected during the COVID-19 pandemic and faced many operational problems such as reduced production due to decreasing demand and supply of goods and services, changing interests of the customers, problems with suppliers that led to a shortage of raw materials, and other financial problems leading to deficit in the company's budget and a lack of liquidity. They all together led to decrease in the company's cash flows which prompted companies to take some measures such as lying off some workers, halving workers' salaries, and rescheduling expenses and obligations (Nawaisah, 2021:2).

The Jordanian government aimed to develop plans to revive the economy and improve the liquidity of individuals and companies to counter the effects of the COVID-19 pandemic, and first included measures to postpone the due dates of public and private sales tax payments for all local and foreign health sectors, medicine and food supply sectors. Second, the implementation of a mechanism for concluding open tax appeals, suspending Social Security Court cases, and easing cash flow restrictions by setting up a mechanism to expedite the settlement of open appeals for companies related to income tax, sales, and customs fees, and suspending cases against defaulters in social security. Thirdly, the voluntary postponement of some components of the social security contribution for a period of up to three months, such as the aging component, and the payment of 16.5 percent to preserve their coverage rights. Fourth, changes in custom duty payments procedures by enabling importers who have not committed previous customs violations to pay 30% of the amount in advance and 70% at a later time without presenting a bank guarantee to ensure the payment of funds. Finally, government extended the validity dates of commercial licenses for all companies in Jordan until June 1, 2020 (EY, 2020).

The massive shock that hit the global economy due to the COVID-19 pandemic brought it into a severe recession and great destruction to human life in an interconnected and integrated world, starting with the preventive measures taken by governments to prevent the spread of the virus, quarantine to preserve human life, closures, stopping commercial activities and restricting transportation between countries. The pandemic turmoil led the world to high unemployment rates, lack of liquidity, disruption of supply chains, and a decrease in production capacity. The result was, a decrease in demand for goods and services, expected annual growth rate of global GDP, and significant changes in the usual consumption patterns of

consumers, the creation of an anomaly in the market, low incomes of families and the loss of their jobs due to the inability to business owners to pay their obligations and pay the salaries of employees. Some countries rushed to develop plans to revive the economy and reduce the burden and costs incurred by the COVID-19 pandemic, and helped improve the liquidity of individuals and businesses, restart sectors, and ease restrictions imposed on economic recovery. However, despite the availability of coronavirus vaccines and many people receiving the vaccine, some businesses and economies are still suffering from the pandemic due to uncertainty in the behavior of the virus.

3.2 The Impact of COVID-19 on Financial Markets

The sudden spread of the coronavirus caused panic and fear among the people due to the lack of healthcare preparedness for infectious diseases in most countries, and its impact was quickly transmitted to the financial markets and affected the behavior of investors, and amplified the volatility of financial markets around the world. The restrictions and preventive measures imposed by governments on the movement of people and business activities to prevent the spread of the virus in all countries negatively affected the financial and stock markets, and investment decreased due to uncertainty in future profits, interest rates hiked, and deep disruptions incorporate liquidity. In reaction to the pandemic, fiscal stimulus packages and quantitative easing by central banks helped restore market confidence by decreasing sovereign bond rates, increasing stock prices, and supporting the dynamics of capital flows. Some governments rushed to develop financial stimulus plans that included injecting liquidity into the market, facilitating access to credit for affected sectors, increasing the volume of lending in banks, and lowering bank cash reserve requirements in order to reduce the inflation of the damage caused by the coronavirus to economic activity and the financial system.

The COVID-19 pandemic impacted the financial indicators of East Asia's main stock markets, negatively impacting economic growth, inflation, and interest rates. That prompted policymakers to develop a fundamental policy to mitigate the pandemic's negative effects on stock market indices in East Asian countries and most affected countries, such as Japan, US, India, Brazil, Russia, France, and Argentina. Re-evaluating the measures imposed by the governments of countries to contain the outbreak of the virus, such as local closures, stopping commercial activities, movement between countries, and quarantine, is useful to support the development of key indicators, keep the pandemic under control, and support investment flows in the foreign portfolio to mitigate the damage to economies (Kartal, Depren, Depren 2020: 2-3).

The rapid spread of the coronavirus increased the risks to stock markets around the world, and many investors incurred large losses at a great time. Some sectors faced difficulties due to closures and movement prevention measures as tourism and aviation sectors. The financial markets responded to the pandemic with dramatic movements, and the reactions were different related to the seriousness of the outbreak in each country and disintegration of the global community. It can be said that, countries not cooperating to confront these challenges is more dangerous than the virus itself; because markets become highly volatile, unpredictable and uncertain which increase economic losses. After the US stock market hit the circuit breaker mechanism four times in ten days during the beginning of pandemic 2020 compared to 1997, it has only been triggered once since its inception, the Federal Reserve announced a zero-percent interest rate policy, and a quantitative easing program of \$ 700 billion then became unlimited after the negative market reactions, and the researcher stressed that this type of unconventional interventions by the US creates more uncertainty and causes long-term problems (Zhang, Hu, Ji 2020:1).

The extraordinary shift caused by the coronavirus pandemic in the regulatory, behavioral and economic environment affected people's production and lives all over the world, thus psychological, behavioral, and moral factors for investors had a negative impact on stock price changes. However, impact on stock markets was not similar for all industries. For example, it is founded that while the response of the performance of the Chinese market and some industries (as transportation, mining, electricity, heating, and the environment) to COVID-19 was negative; some sectors (as health care, education, information technology, and manufacturing) were able to withstand the challenges and economic damages (He et al. 2020a:2).

The policies adopted by the Chinese government at the beginning of the crisis were effective, which led to decrease in number of deaths and cases. However, it also led to a profound disruption in the economies and liquidity of most companies operating in most business sectors. Moreover, it was expected that a local economic collapse would lead to catastrophic disruptions in the global financial markets. This issue required the Chinese government to adopt financial monetary and commercial support policies to avoid the domestic economic collapse by facilitating the credit market, meeting working capital needs, providing financial support to SMEs business and facilitating their access to finance, policies to support international trade, and foreign investment, injecting liquidity through increasing the share of the financial authority in newly issued government bonds, and the reduction of cash reserve requirements in the central bank of China (Huang et al. 2020: 1-2).

The COVID-19 pandemic affected the financial markets significantly, and global stocks continued to achieve a return of 15% in 2020, with increased investments based on growth expectations in the countries that led the way in the vaccine race for the coronavirus, as the relationship between vaccination rates and growth expectations played a prominent role in the markets currencies. Financial markets rose due to the huge amount of financial and monetary stimulus provided by governments around the world (Fong, 2021).

Corporate cash flows have been adversely impacted by the COVID-19 pandemic, and corporate finance has become critical to countering the liquidity issues and their transition into a financial crisis for some company models that do not comply with social distancing. During COVID-19, the non-financial corporate sector in the US entered carrying high levels of debt on its balance sheets, which poses a major threat and an obstacle to investments when the recovery begins. The policies taken by governments to confront the pandemic resorted to placing banks as the first line of defense and allowed them to meet the financing needs of companies to provide liquidity and support their monetary position, and a greater increase in the volume of lending in banks located in severely affected communities. They indicated that the Federal Reserve's decision to buy corporate bonds had a positive impact on improving the ability of companies to benefit from the bond market when stock issuances are very expensive or impossible to implement (Ellul, Erel, Rajan 2020).

The outbreak of the COVID-19 pandemic has caused significant and growing concerns about the health, economic and financial consequences for businesses and the financial sector around the world. Price movements and confidence were affected by a decrease in stock and futures markets, which caused a decrease in the annual growth of dividends by 8% and a decrease in GDP by 2% in each of the US and Japan, also a decrease in the annual growth of dividends by 14% and a decrease in GDP by 3% in the European Union. Although the fiscal stimulus plans to boost the stock market contributed to improving the expected profits to overcome the damage caused by the pandemic, it did not increase the short-term growth expectations in all geographical regions (Gormsen, Koijen 2020:1).

The government policies that were taken to confront the COVID-19 pandemic in 2020 supported the financial stock markets during the crisis. Stock markets in countries with low unemployment rates and low valuations compared to high expected profits were characterized by more financial immunity from the health care crisis. Low debt, high profitability, cash reserves and liquidity are important elements in strengthening the company's financial position throughout the crisis. Companies with diversity, high environmental ratings, and degrees of environmental, institutional, and social governance are more prepared and immune to the COVID-19 pandemic's harmful impacts. The findings revealed that capital

strength is not confined to traditional economic variables like the unemployment rate, but also to a range of elements including proactive government activities and policies, government culture, and mapping. A better understanding of potential factors affecting financial immunity, effective risk management, and improving investor portfolio management through investment allocation and diversification risks to improve and strengthen the domestic capital market's financial immunity against future crises due to black swans (Zaremba et al. 2021).

Global financial markets fluctuated sharply, with the focus of the coronavirus moving from China to Europe and then the US, which led to an increasing state of panic and a rapid deterioration in the markets. The pandemic invisibly affected the stock markets by eroding a quarter of wealth with S&P 500 to post down by 30% in nearly a month, even relatively safer commodities such as gold earnings negatively suffered from the transmission of the pandemic to the US and all over the world. The study of Ali, Alam and Rizvi (2020:1) stressed that the number of new cases announced for the coronavirus inside and outside of the China has a mixed effect on financial markets. The findings indicate that while, Chinese markets were relatively calm with fewer fluctuations during the pandemic period, and the death rates of the coronavirus announced outside of the China have strong effect on the fluctuations of other financial markets.

The negative effects of the COVID-19 on social and economic life and also on financial markets have created a state of extreme panic and mistrust among investors which negatively affected their decisions (World Bank, 2021).

During the spread of the coronavirus, governments have imposed social distancing measures and restrictions to reduce physical contact between individuals to prevent the spread of the virus and mitigate health and economic damages and reduce their inflation on human behavior and economic activity. This also affected digital payments in the field of financial technology due to, the difficulties in accessing finance by many companies. This was contributable in enhancing safe ways of access for governments, suppliers, and individuals by focusing on digital financial services and electronic commerce in ensuring a successful strategy for social distancing (Alber, Dabour 2020:109).

The financial markets and the stock market in Nigeria also responded quickly to the local and global growth of the total confirmed cases and deaths of the coronavirus which, affected the performance of the stock market negatively and led to decrease in stock returns in Nigeria. A recent study explained that the Nigerian government must rescue companies and individuals affected by the pandemic through facilitating

and guaranteeing credits, subsidies, targeted spending, tax filing, and increasing government budget allocations to enhance market and business confidence (Kumeka, Falayi, Adedokun 2021).

As most of the businesses in the world, companies in Jordan have been also affected by COVID-19 pandemic. Some negative impacts for companies can be ordered as, increase in debt, decrease in their competitiveness and, long-term resilience. The number of financial reserves available to face the continuous decline in revenues, the ability to deal with daily cash flows, being able to cover current expenses and debt, and the ability to access credit to provide liquidity are found to be important factors that can increase the flexibility and financial efficiency of companies for facing with the negative effects of the pandemic. Some, policy recommendations were as follows: providing support to Jordanian companies that were deeply affected during the crisis, which will provide job opportunities for a large proportion of the population, enhancing dialogue between the public and private sectors, additionally strengthening incentives for digital transformation to bridge the gap and introduce new business models for more flexible and inclusive economy and society (ILO, UNDP 2021).

The spread of the coronavirus affected the global financial markets. Many sectors, companies, and investors incurred heavy losses and a decrease in their cash flows and revenues, with the increase in government measures imposed on the country, which was negatively reflected and led to severe fluctuations in stock markets, stock prices, and assets. The pandemic has increased distrust among investors and led to, change in their behaviors. Due to the shocks of uncertainty in monetary and recovery policies, and the behavior of the virus; governments were motivated to provide financial support for the affected sectors, facilitate their access to credit, pump liquidity, and increase the volume of lending to enhance and improve the efficiency of financial markets and business confidence.

3.3 The Impact of COVID-19 on Stock Markets

After the first case of the COVID-19 was reported in China, countries took quick measures and imposed containment measures as the imposition of quarantines, closing cities and borders, and restricting people's movement to limit the spread of the virus. Accordingly, major events and government policies greatly affected stock market returns and investment environment for both individuals and businesses. The growth in the total confirmed cases and the total deaths caused by COVID-19 affected the global stock market indices negatively in general and led to fluctuations in trading volume and stock market returns. As a result, the financial markets became highly unpredictable, which affected the behavior of investors in their aversion to risks and caused them to sell their financial assets. People who interact in markets with

uncertainty begin reducing investment in assets with high risks, which makes the markets more bearish. Global stock markets eliminated about \$6 trillion in wealth in six days in February of 2021 according to S&P Dow Jones Indices. It was due to a massive sell-off in the coronavirus led market which caused by fear and panic among investors over the uncertainty about how bad the situation will be and corporate profits will fall due to the impact of the coronavirus.

The COVID-19 pandemic led to a major economic shock, and the impact of the virus outbreak had a negative reaction on the stock markets. The study of Alber (2020b) indicated that COVID-19 which is measured by cumulative new cases and new deaths has a significant impact on the return of the stock market index. The findings based on a sample of six countries demonstrated that the stock market return is more sensitive and affected by new cases of coronavirus. The strength test confirmed the negative impact of the spread of the coronavirus on the return of the stock market in China, Germany, France, and Spain. Alber (2020a:1) has also measured the impact of the outbreak of the COVID-19 pandemic on European stock market including countries of Belgium, France, Germany, Italy, the Netherlands, Spain, and the United Kingdom by utilizing panel data analysis methodology. The results showed the abnormal strength of the stock markets during the first and second periods. Moreover, it was found that, markets were more sensitive to cases than deaths figures, and also cumulative indicators of coronavirus were more influential than the number of new cases.

Policy responses to the COVID-19 pandemic have been different between countries. The global nature of the pandemic has made it clear that the global economy and financial markets will be severely affected and stock markets have quickly plummeted by the time the pandemic has become a pandemic. The COVID-19 pandemic negatively affected economic activity and had a negative impact on stock markets in most of the countries in the early stages of the outbreak. Investor sentiment turned bearish in early 2020, after the announcement of the rapid outbreak of the coronavirus together with the increases in new cases and deaths in most countries. The degree of uncertainty in the financial markets increased and investors rushed to buy safe assets with high liquidity, which led to sharp declines in stock market indices. Conservative measures and business closures imposed by governments to save human lives also negatively affected economic activity and led to the worst global recession since the great depression of 1929. The negative impact on stock returns through market risk premiums and increased volatility in the main European stock markets and reduced liquidity in emerging countries, which accelerated the decline in stock markets (Caporale, 2021).

After the outbreak of the COVID-19 pandemic, the predictability of the CDS market decreased. The breadth of the CDS index indicates that market agents consider the probability of a company default higher because it indicates the riskiness of a particular company or country. The swap-default spread indicates some of the company's credit risk information better than stock and bond prices (Romanyuk, 2021). The results of a recent study indicate that macroeconomic news announcements reduce uncertainty in the CDS market and generate abnormal changes in price differences, as news greatly affects the CDS market in financial companies' markets and CDS prices are inversely related to good or bad news. CDS and stock prices predict and confirm the news of abnormal returns, and good news has a greater economic and statistical impact on CDS prices than bad news. CDS is an accurate capture of the credit risk that is inherent in a country's economy and liquidity in the CDS market is represented by CDS margins of demand. The institutional investors who dominate the market need to closely monitor CDS price behavior in hedging operations and risk dynamics Lu, Passariello and Wang (2021). Moreover, it is demonstrated that an increase (decrease) in the stock return is accompanied by a fall (rise) in the CDS premium. This was confirmed by the researchers Yang, Samitas, Kampouris (2020) that local individuals trade opposite to foreigners, as the net positive stock purchases of local institutions (individuals) predict positive (negative) returns on shares and changes in the spread of negative (positive) default swaps on the next day, in response to the shocks of both stock returns and changes in the spread of default swaps in the same day.

The COVID-19 pandemic affected the US stock markets and the economy following, the closure measures and restrictions imposed by the government on commercial activities which led to disruption in a large number of sectors and financial markets, and decrease in asset prices and US stock returns. The study of Baig et al. (2021:1) showed evidence that increase in confirmed cases and deaths US, decline in the morale and confidence of investors and implementation of contracts led to a huge deterioration in the liquidity of the US stock markets.

A study focusing on the impact of the spread of the COVID-19 on returns of the stock market in China confirmed that the daily growth in the total confirmed cases and deaths of the coronavirus interacts negatively with the returns of the stock market in all companies. Moreover, the returns of capital stocks with a large market value were also negatively affected compared to stocks with small market value (Al-Awadhi et al., 2020: 1-2).

The increasing financial and international integration has made financial markets more vulnerable to shocks and unexpected events such as crises and epidemics. The CDS index played an important role as a

major driver of systemic risks in the presence of negative shocks. It is considered as an important indicator to reflect the quality of credit and the health of financial markets for companies and countries. A recent study confirmed the existence of a high two-way relationship between CDS returns and the conditional volatility of stock market indices during the COVID-19 pandemic, which changed the existing dynamics of causality between the credit swap market and stock market volatility. Studies during crises such as the sovereign debt crisis and the mortgage crisis proved the role of CDS as a destabilizing element for financial stability in countries, and the rapid transmission of credit risks around the world due to the exposure of financial institutions to such derivative instruments because they are the most traded derivatives in the market and the most liquid (Ballester, Escrivá and González-Urteaga, 2021).

A study focusing on China showed that the daily increase in confirmed cases in China has affected the returns of the Chinese stock market negatively for various sectors and, individual companies. It explains that financial markets are behavioral because they are driven by humans, so identifying the nature of the challenge facing investors, individuals, fund managers, portfolios, companies, and policymakers during the COVID-19 pandemic is required to avoid more negative consequences of the coronavirus pandemic from major social and political turmoil and mitigate stock price reactions and high volatility in the stock market (Apergis, Apergis 2020:2).

The whole world is facing a great challenge related with the impact of the COVID-19 pandemic on the performance of stock markets, and also disruptions in production and supply worldwide. The fear of the pandemic is a reason for public concern about stock market fluctuations. The increase in new cases and deaths of the coronavirus announced in the world and the US has exacerbated the financial turmoil and increased volatility in the American financial market and thus affected the global financial cycle. The state of increasing uncertainty surrounding the epidemic affected the required rate of return and thus the market value of the stock and it also decreased the market value of the S&P 500 index. Public concerns related to the coronavirus and restrictions imposed at the beginning of the pandemic led to a rise in the VIX index which reflects investor fears, exacerbated the lack of liquidity, and instability in stock markets (Sadiq et al. 2021).

The stock markets witnessed significant movements in response to the arrival of news of the COVID-19 pandemic, amid the overall decline in economic activity due to direct effects such as social distancing and indirect effect as supply chain links, which led to a massive dispersion in returns at the company level as share prices correlate with expectations of future earnings growth, and due to the uncertainty and variation in profits and stock prices after the pandemic. The results of the average returns of the US stock

market versus the Inter-Quartile Range of individual returns in the first quarter of 2020, average returns increased or decreased by at least 2.5 percent, with greater variation in the results of movements at the company level (Davis, Hansen and Seminario-Amez, 2020a). Bad news and monetary and fiscal policy responses related to the COVID-19 pandemic were found to have significantly negative impact on the stock returns of the companies with high exposure to travel, accommodation, traditional retail, energy, aircraft production, residential construction, and real estate investment funds, and restaurants. While some sectors as drug trials, e-commerce, basic foodstuffs, video games, web-based services, metals, financial management, electrical equipment, computerized tug, and metals that fuel semiconductor supply chains were found to be affected relatively in a positive manner (Davis, Hansen and Seminario-Amez, 2020b).

The financial strength of the company is of great importance in addressing global crises and pandemics and the interactions of stock prices with the actual awareness of the emerging crisis of the COVID-19 in 2020 together with the policy responses and unknown individual behaviors to reduce the effects caused by the pandemic. Corporate debt and cash holdings have emerged as an important driver of company value to reduce its high risks due to the coronavirus and its disproportionate impact on inventory yields across industries, even after the Federal Reserve's policy interventions in the bond market to bolster credit to large corporations and reassure investors. Confirmed that leverage and high corporate debt are a source of concern for investors and analysts about the survival chances of cash-poor companies and high-value companies, the stock prices of internationally oriented companies are greatly affected by changes in expected trade policies, and the patterns identified in the cross-section of returns that reflect concerns about the prospects for individual companies (Ramelli, Wagner 2020).

The health crisis of the COVID-19 pandemic affected the social and economic aspects in nearly all countries. The study investigating the impact of novel coronavirus on the Romanian stock market showed that the number of new cases and new deaths due to COVID-19 had negative long-term impact on Bucharest Stock Exchange Trade (BET) index. While a positive impact of interest rates on monetary policies in the Romanian stock market, these findings help national authorities in the effective management of mitigating the economic and health damage caused by the COVID-19 pandemic (Hatmanu, Cautisanu 2021).

A multi-country study conducted by Ashraf (2020:1) which evaluated the impact of COVID-19 on stock market returns in 64 countries provided evidence that the reactions of the markets were strong during the early days of the spread of COVID-19. Moreover, it was founded that their response was

negative with respect to growth in confirmed new cases. The final result documented a negative relationship between COVID-19 and selected markets' stock returns.

The impact of rapid spread of the COVID-19 pandemic was investigated on the returns of the 26 indices in Borsa Istanbul (BIST). The Findings showed that most sectors have negative cumulative returns caused by the COVID-19 pandemic, and some of them had a positive evaluation of teamwork. The highest loss rate caused by the coronavirus was observed in the following sectors: sports, tourism, transportation, brokerage, textiles, and insurance. On the other hand, the sectors that had a positive value in the face of the pandemic events were documented to be wholesale and retail trade, food and beverages, banking, mining, plastics, gasoline, industries, and wood-paper printing. They had a higher value due to changing consumer behavior motivated by meeting their basic needs, for this reason, the cash flows of these sectors were continuous, which made them more attractive to investors (Göker, Eren and Karaca, 2020:14).

The news media had a major role in influencing the indicators of the returns of many sectors in BIST. For example, it is stressed in the study of Tan (2021:1) that the news related to the coronavirus pandemic, and the news of BIST can be used to indicate that media communication channels and more efficient media content to rely on comprehensive strategies to mitigate the financial turmoil and stock returns in the BIST caused by the COVID-19

The spread of the number of cases and deaths caused by the COVID-19 pandemic has escalated to nearly all countries, and governments have taken measures, in response to the virus, to impose restrictions on closures between countries and commercial activities, and social distancing to limit the spread of the coronavirus. The government restrictions caused panic among people and reflected negatively on the financial markets, and led to disturbances in the behavior of investors and decreased stock returns due to the uncertainty of asset and stock price predictions. As a result, another study conducted by Öner and Aybars (2021:1) for Turkish stock market showed the impact of growth in the number of new cases and deaths of the coronavirus pandemic in Turkey negatively affect the stock returns.

Even the degree of impact due to the novel coronavirus varies among countries most of the studies provide evidence for negative impact of the pandemic on financial markets. A study focusing on GCC countries also revealed significant impact of the virus on stock returns. The findings showed that there is a large difference between stock market indices and stock market returns are sensitive mostly to the new deaths from the coronavirus for the year 2020. As the COVID-19 differs in its characteristics from the previous pandemic, it is not only a health crisis, but it is important to focus on the economic shocks caused by the COVID-19 pandemic and to develop plans to invest in public health and development for its role in

improving the quality of life as an engine of economic growth because diseases arise in poor countries due to overpopulation, poor public health and interaction with wild animals (Alber, Saleh 2020:16).

The negative impact of the spread of the coronavirus which is measured by the number of cumulative deaths and new deaths resulting from the COVID-19, on the returns of the stock market in the Middle East and North Africa region including countries namely; Egypt, Jordan, Morocco, Qatar, Saudi Arabia, United Arab Emirates, and Tunisia, were analyzed. The strength test conducted showed a significant impact of the cumulative cases of the coronavirus on the stock market indicators in Jordan and Tunisia, and a significant impact of the cumulative deaths of the coronavirus on the stock market indicators in Jordan, Morocco, and Tunisia (Arafa, Alber 2020:1).

As well as new developments and new policy solutions that can stabilize the market to some extent, but the uncertainties surrounding the COVID-19 pandemic still threaten capital markets, given the challenge of controlling the pandemic. Such pandemic events lead to the collapse of the financial system, high volatility in stock markets, and lead to geopolitical risks. The literature review summarized indicates that the massive shock of the COVID-19 pandemic had a negative reaction on the indicators for returns of global stock markets. The closure measures imposed by governments to prevent the outbreak of the pandemic led to turmoil and a decline in the morale and confidence of investors and uncertainty concerns about global recovery from the crisis, to a significant deterioration in asset prices stock market returns and liquidity. Most research confirmed that the continuous growth in the total confirmed cases and deaths from the coronavirus interacts negatively most of the stock market returns, especially the returns of capital stocks with large market value. It further leads to negative reactions in stock prices, high volatility in the stock markets and financial restrictions at the national and international levels.

3.4 The Influence of COVID-19 on Jordan Economy with Numbers

Even the literature related with the impact of COVID-19 on global economy, financial markets and stock markets were summarized, the impact of the novel coronavirus on Jordan economy with numbers will be specifically explained in this sub section.

Jordan is an Arab country located in southwest Asia, with an area of 89,213 square kilometers, and it shares borders with five states: “the Kingdom of Saudi Arabia from the south, the Syrian Arab Republic from the north, the Republic of Iraq from the east and the occupied Palestinian territories from the west, in addition to the maritime border it shares with Egypt in the Gulf of Aqaba”. According to the Department of Statistics Jordan (2022b) data from its census, Jordan’s population is around 11,185,505 on July 01,

2022. In 1921, Prince Abdullah bin Al-Hussein the First established the Emirate of Transjordan which became independent in 1946 from the British Mandate. Jordan is based on a modern constitution, with a representative monarchy and hereditary system, which made it unique in its unity, diversity, and stability (King Abdullah, 2022).

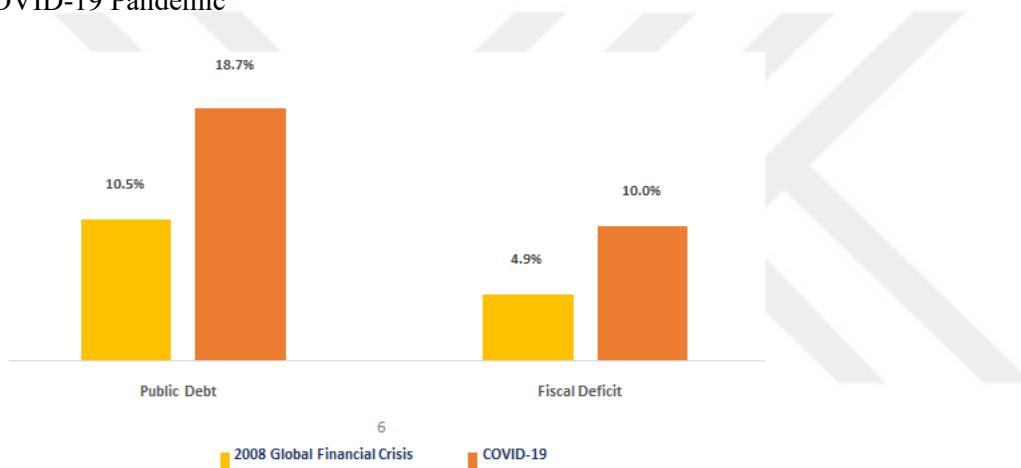
The COVID-19 pandemic affected the Jordanian economy in all of its business sectors in general. According to the monthly report issued by the Department of Statistics, the value of total exports during 2020 decreased by 4.5 percent when compared with the same period in 2019. According to what the Central Bank of Jordan (CBJ) published in the annual report for the year 2020 in light of the repercussions of the coronavirus pandemic and the accompanying economic closures, the gross domestic product at constant market prices in 2020 recorded a contraction of 1.6 percent compared to a growth of 2.0 percent in 2019. As for imports, they decreased during 2020 by 11.3 percent compared to the same period in 2019. The deficit in the trade balance, which is the difference between the total value of imports, and the total value of exports, reached 6438.1 million Jordanian dinars (JD), and thus the deficit decreased during 2020 by 16.5 percent compared to the same period in 2019 (Department of Statistics Jordan, 2021a).

The IMF has provided emergency assistance worth \$400 million to support Jordan's efforts to combat the pandemic. The Jordanian government has also implemented many measures to mitigate the damages of the pandemic, such as tax exemption, setting up temporary cash transfer programs for the unemployed and day laborers affected by the crisis, and providing in-kind assistance to the elderly and sick. The CBJ has also issued several decisions, including postponing loan payments, extending the grace period for repaying loans, and providing credit facilities to financially troubled companies (OECD, 2020d).

Following the COVID-19 lockdown, Jordan's GDP decreased by 23% and production decreased by 30% in the second quarter of 2020 compared to the second quarter of 2019. This was due to the government's closures and restrictions on non-essential economic activities and people's movement to prevent the virus from spreading. While food systems have seen production drop by 40 percent, employment losses have been estimated at more than 20 percent, and household income has fallen on average by about a fifth due to closures, a downturn in service and manufacturing activities, and a drop in remittances from abroad. It was expected that the pace of recovery would be slow to revive the Jordanian economy, which would provide an opportunity for policymakers to promote sustainable economic transformation and structural change, increase flexibility and create job opportunities to mitigate the high unemployment rate and move toward more economic diversification policies (Raouf, Elsabbagh, Wiebelt 2020).

The global economy entered a severe recession due to the massive shock and the rapid spread of the coronavirus and also due to the various closure measures imposed by governments to prevent the spread of the virus. Governments in most countries rushed to adopt many measures to support the financial sector to achieve its stability and maintain the flow of credit and liquidity to the most affected sectors. The IMF has estimated that the global public debt will rise to 18.7%, and the global financial deficit will rise by 10% of GDP, higher than the damage caused by the global financial crisis of 2008 as shown in Figure 1 (JSF, 2020a).

Figure 1: Changes in Public Debt and Fiscal Deficit between the 2008 Global Financial Crisis and COVID-19 Pandemic



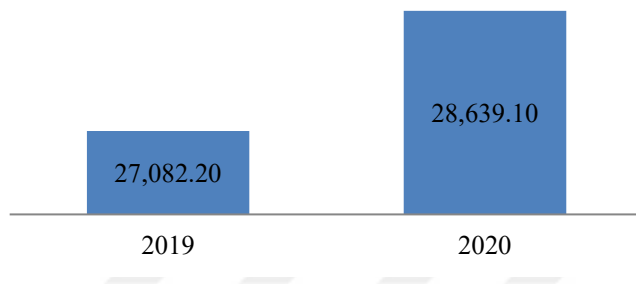
Source: International Monetary Fund (Jordan Strategy Forum, 2020, 3/1)

The decision to stop trading activity at the ASE to reduce the financial turmoil resulting from the COVID-19 pandemic resulted in a decline in the market value to about 13.5JD billion (\$19 billion) which is a level not seen since 2005, a decrease in the activity of institutional funds and government incentives, and a decline in the average daily trading activity for four million dinars. In addition, investors were affected by the CBJ's decision to stop distributing cash dividends to provide liquidity. Furthermore the Arab Bank's share decreased by 2.33 percent, which represents a quarter of the total market capitalization, and an increase of 50 percent of the shares owned by foreigners of the total market capitalization because there are no restrictions on foreign ownership with restrictions on the sale and use of treasury shares (Al-Khalidi, 2020).

During the COVID-19 pandemic, the CBJ took some precautionary procedures to mitigate the negative repercussions of the coronavirus on the performance of the local economy such as providing credit facilities granted to individuals and companies of sectors affected during the pandemic by postponing

installments without commission, launching a concessional financing program worth 500JD million for small and medium-sized enterprises. Injecting liquidity to banks with a value of 550JD million enables banks to reduce the interest rates they charge on the facilities granted by them to all economic sectors, by reducing the required reserve ratio on deposits for banks from 7% to 5%, as it continued its positive growth during the year 2020 compared to the year 2019 as shown in Figure 2. This gives banks the ability to lend more, which increases liquidity. The Jordanian corporations play the role of the guarantor to guarantee loans and support them by reducing loan guarantee commissions and increasing the coverage of the local sales guarantee program (CBJ, 2020).

Figure 2: Total Credit Facilities (JD Million)



Source: Central Bank of Jordan, Annual Report 2021.

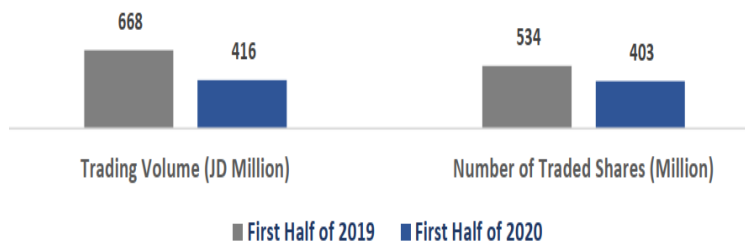
The COVID-19 pandemic has affected the world's economies and global financial markets significantly, has also cause turmoil and fluctuations in the Jordanian financial market. The study of Yaseen and Omet (2021:1) confirmed that the spread of the coronavirus and the closure of trading in the secondary market of the ASE led to a high cost of liquidity for the shares of listed companies. Policyholders made urgent policies and strategies for the continuity of the high cost of liquidity after the resumption of trading in the ASE through the introduction of market makers. Moreover, the establishment of government's regulatory bodies set policies and recovery plans to stimulate the liquidity of the Jordanian stock market, and support affected industries and emerging markets.

The COVID-19 pandemic has affected the financial environment in Jordan, the public interest, and the profits of the banks listed on the ASE, as the trading volume of shares decreased by half since the suspension of trading in the month of five on the ASE. Despite the significant impact facing the global economy, it was necessary for Jordan's leadership and government institutions to focus on what makes it important, not just financial attacks, by looking at Jordan's monetary environment as the best strategy to

get the Jordanian economy back on track and recovering from the damage caused by the coronavirus (Abu Saleem, Saleem, Oleimat 2021:1).

After the announcement of the first infection with the coronavirus in Jordan, the government took the necessary measures and imposed restrictions to contain the virus, prevent its spread and mitigate its damage to health and the economy. The ASE closed trading for approximately two months, which negatively affected the performance of the stock exchange as shown in Figure 3. In the first half of the year 2020 the total trading volume decreased more than in the same period of 2019, and the total number of shares traded in the stock market decreased due to the increase in investor fears and uncertainty regarding the behavior of the virus (ASE, 2020).

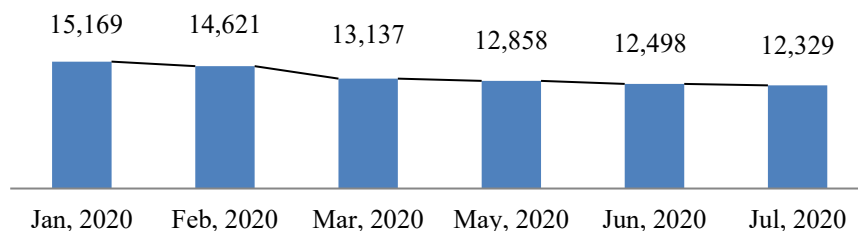
Figure 3: Number of Trading Shares and Trading Volume (JD Million)



Source: Amman Stock Exchange's (Jordan Strategy Forum, 2020, 7/8).

We can see the negative impact of the COVID-19 pandemic on the market capitalization of the shares of companies of all sectors listed on the ASE in Figure 4. The closure of the ASE on March 17, 2020 together with, the preventive measures imposed by the government led to significant decrease in the market capitalization.

Figure 4: Market Capitalization of ASE in 2020 (JD Million)



Source: Amman stock Exchange, Monthly Statistical Bulletins, 2020.

The study of Elshqirat (2021) tested the effect of the coronavirus on the presence of grazing behavior in the ASE by using the Cross-Sectional Absolute Deviation method. The researcher showed that the COVID-19 pandemic does not affect the grazing behavior in the Jordanian stock market at the market and industry levels. This explained that the strict measures and decisions taken by the Jordanian government to close the ASE after the announcement of the COVID-19 pandemic contributed to mitigating the epidemiological impact on the stock market. However, studies in developed markets such as Europe and also emerging markets as China, and the Gulf Cooperation Council countries showed evidence for the impact of pandemic on herding behavior.

The quick spread of the coronavirus created a severe shock to Jordan's local economy, prompting the imposition of preventive measures such as a complete shutdown of all commercial activity, a curfew for the people, and the closing of Jordan's borders. The pandemic had a negative impact on the financial sectors, leading the ASE to suspend trading and the market value to fall. The CBJ implemented steps to reduce the impact of the COVID-19 pandemic, such as credit facilities for financially troubled people and businesses and liquidity injections into banks to strengthen their capacity to make loans.

4. RESEARCH DESIGN

The current study sought to investigate the impact of the novel coronavirus pandemic on the stock market returns in Jordan through the use of quantitative design to provide accurate and proven results. The research approach relied on a detailed review of the existing literature, including articles and research papers. This section will explain all aspects of experimental research, including hypothesis development, dataset, variables, methodology utilized, and empirical research models, respectively.

4.1 Hypothesis Development

Kumeka, Falayi, and Adedokun (2021) found that COVID-19 has a negative effect on the performance of the stock market returns in Nigeria. Furthermore, Caporale (2021) claims that the responses of global policies and economies to the COVID-19 pandemic negatively affected stock returns of the US and the five European countries (the UK, Germany, France, Italy, and Spain), and stock indices fell sharply because of the rapid collapses in stock markets together with the increasing the degree of uncertainty. Besides the study of Baig et al (2021) the significant deterioration in stock market liquidity and the decline in asset prices negatively affected stock returns of US equity markets due to the increase in confirmed cases and deaths from the coronavirus, which led to a decline in investor confidence. Al-Awadhi et al (2020) stressed the growth of total confirmed cases and deaths from the coronavirus has negatively affected the returns of capital stocks with large market capitalizations on the Chinese stock market, because interacts negatively with the stock market returns and led to a decline the returns.

Apergis (2020) presented that the daily increase in confirmed cases of the coronavirus negatively affects the Chinese stock market returns because the nature of the epidemic reflects a negative impact on the returns of shares of various sectors. According to Chen and Chiang (2020), the COVID-19 pandemic increases the instability of global financial stock markets, and negatively affects stock returns of China's market, because of the low uncertainty of stock prices and future profits. Davis, Hansen, and Seminario-Amez (2020) emphasized the large movements during the pandemic that the stock markets witnessed had a negative impact on the returns of US companies' stocks and future earnings growth due the bad news related to the daily increase in confirmed cases and deaths of coronavirus. Hatmanu and Cautisanu (2021) confirmed the negative impact of an increase in the number of new cases and new deaths from the coronavirus on the decreased returns of Romania's stock market indices. The study of Ashraf (2020) suggests that stock markets response varies over time depending on the stage of the pandemic.

Stressed in the study by Tan (2021) the negative impact of coronavirus on the returns of the indicators of many sectors in Borsa Istanbul is due to the impact of the media and news related to COVID-19, which led to the financial turmoil in the stock market. Öner and Aybars (2021) confirmed that the spread of cases and deaths of the coronavirus negatively affects the stock returns in Borsa Istanbul. Similarly, Göker, Eren, and Karaca (2020) also showed that coronavirus has an impact on sector index returns in Borsa Istanbul. Studies by Alber and Saleh (2020), and Arafa and Alber (2020) supported the negative relationship between the increase in the growth of cumulative cases and deaths due to the coronavirus and stock market returns of GCC and MENA regions, since the virus increases the sensitivity of stock index returns, in light of uncertainty. In line with the above mentioned studies we also expect a negative link between COVID-19 and stock return. Accordingly, the below general hypothesis has been proposed:

H0: There is negative relationship between COVID-19 and stock returns

Following the prior studies in literature, it can be stated that some control variables have also the potential to influence stock market returns at different levels. Therefore, further analyses are conducted to observe the individual impact of the Volatility Index (VIX) and Crude oil prices (OIL). According to Whaley (2009); Fernandes, Medeiros, and Scharth (2014); Simon (2003) we also expect a negative impact of VIX on stock returns for the Jordan stock market, because it makes investors' expectations more sensitive to negative shocks to avoid risks and increases uncertainty in financial markets. Kumar (2010) confirmed the negative relationship between India's market returns and volatility during the stock market decline because the VIX index is used to predict stock market volatility as a tool to hedge against market risks. Schwert (1989) explains the negative relationship when changes in stock exchange volatility in the US are associated with changes in the expected returns of stocks, due to a persistent and high change in the volatility of future cash flows. Sarwar and Khan (2016) investors' fears increase when the financial markets are turbulent, which leads to an increase in the VIX of the US stock market and reduces stock returns. However, a large body of empirical studies Gao, Ren, and Umar (2021); Albulescu (2020, 2021); Onali (2020); Baker et al (2020) supports the negative impact of the VIX on the stock returns and stability of US and China stock markets. It is founded that due to the increasing VIX, stock markets increases international financial pressures and lowers uncertainty about predicting future stock prices. Related with the other control variable of this thesis, literature supports a positive association between crude oil price and stock returns in the US, Canadian, United Kingdom, and Japan stock markets (Salisu and Oloko, 2015; Jones and Kaul, 1996; Kilian and Park, 2009). Which that the reaction of international stock markets is consistent with oil shocks, due to the presence of a positive impact when the crude oil market

indicators rise on the returns of the stock exchange in the stock markets. Sharif, Aloui, and Yarovaya (2020), and Zhang and Hamori (2021) confirm the positive relationship between oil prices and stock returns, as oil prices were negatively affected during the COVID-19 pandemic due to high volatility in stock markets and uncertainty in the continuation of the pandemic. This reflected negatively on stock market returns in the US, Japan, and Germany. The study by Muhtaseb and Al-Assaf (2017) that high oil prices have a positive impact on the stock market in oil-exporting countries through income and wealth effects. Consequently, the rise in government spending on purchasing goods and services raises the level of economic activity and improves stock market returns in these countries. Consistent with the previous studies, we expect a negative link between VIX and stock returns and a positive link between crude oil prices and stock returns.

4.2 Dataset

The main data set used in this study consists of weekly return indices of total 16 sub-indices listed in the Amman Stock Exchange (ASE). The index data is obtained from the official website of Amman Stock Exchange. Selected indices have been distributed in three sectors of the ASE namely: financial sector, services sector, and industrial sector. These sector indicators appear in Table 1 in the Appendix. The data collected was organized as balanced to be used in panel data analysis. As a starting point, the beginning of the study period was selected as March 2, 2020, when the first case of the coronavirus was officially announced in Jordan. However, since the Jordanian government decided to close trading activities on the ASE for a period of 50 days, the beginning of the sample period was selected as May 10, 2020. The final data set covers the time period between May 10, 2020, when trading resumes on the ASE, and Jan 12, 2021, when vaccines for the coronavirus were imported for the first time in Jordan. The reason for such a selection of the ending time for the analysis is due, to eliminate the potential effects of vaccines on the returns of the stock index, and to be able to calculate the growth in the weekly number of confirmed cases and deaths of COVID-19. The final period used in this study covers a period of weeks between May 17, 2020, and January 17, 2021, using the weekly numbers of confirmed cases and deaths for the world, and the weekly numbers of confirmed cases for Jordan, together with the returns of the ASE index. The number of confirmed cases and deaths of the COVID-19 pandemic in Jordan and worldwide are obtained from the Jordanian Ministry of Health and the World Health Organization, respectively. Weekly data for the index returns obtained from official website of the ASE. To calculate index returns in percentage terms weekly closing prices are utilized for each of the selected index. Additionally, weekly data for the

Volatility index (VIX) was extracted from Thomson Reuters international database and weekly data of Brent crude oil price was obtained from investing.com.

The ASE weekly index returns, which are calculated from the closing index prices, represent the changes of dependent variables on the respective models. The explanatory variables are the weekly increase in new confirmed cases and deaths of COVID-19 in the world, and the weekly increase in new confirmed cases of COVID-19 in Jordan, in line with studies of Alber and Saleh (2020); Arafa and Alber (2020); Ashraf (2020); Öner and Aybars (2021); Ozkan (2021) and Tan (2021). One of the control variables selected to be included into the analysis is the Chicago Board Options Exchange Volatility Index (VIX), which refers to the level of anxiety and fear in stock markets, and measures the degree of market turmoil, volatility and uncertainty in stock markets. The second control variable is selected to be the International Oil Price, which reflects stock market fluctuations; it refers to the strength of countries' economies and global financial markets. Oil prices are one of the engines of global stock markets and are positively correlated with stock returns, as the impact of the oil shock leads to a major recession in economies and the fall of global stock markets. As a proxy for international oil prices, we used Brent crude price data; because it is widely used as a benchmark for pricing oil and oil-related products, and it is very positively correlated with the prices of two other major categories of crude oil West Texas Intermediate (WTI) and Dubai (Bouri, 2015).

4.3 Variables

All variables that will be used in the analysis will be explained in sub-sections namely, dependent variable, independent variables, and control variables as shown in Table 2. While dependent variable of the study has been measured by the weekly index returns (IRJ) of selected sub-indices in ASE of Jordan, the independent variables which are used as proxies for the novel coronavirus have been measured by the growth in a number of COVID-19 weekly confirmed new cases in Jordan (GJOCASE), the growth in a number of COVID-19 weekly confirmed new cases in the world (GWCASE), and the growth in a number of COVID-19 weekly new deaths in the world (GWDEATH), respectively. Chicago Board Options Exchange Volatility Index (VIX) and Brent Crude Oil Price were also used as control variables in the study. Data are obtained from ASE, Investing.com, and the international database of Thomson Reuters, on weekly basis for the period between May 17, 2020 and January 17, 2021.

Even as a starting point Sovereign Credit Default Swaps (CDS) of Jordan which is related to the risk of default on the securities issued by governments and companies, and an indicator for a measure of the

reliability of the financial and economic position of the country, and a measure of the risk of sovereign default for countries was also included as a control variable into the analysis, later we have eliminated it due to some problems. The weekly CDS premiums for Jordan were too close for all weeks in the analysis period which cause panel data analysis to omit it. Moreover, one of the independent variables, namely; the growth in a number of COVID-19 weekly new deaths in Jordan which is selected to be used in the analysis at the beginning was also excluded from the analysis since Jordan announced any data related with it till August, 2020.

Table 1: The Variables Utilized Together with Their Abbreviations

Abbreviation	Variable
IRJ	Weekly Index Returns of Jordan
GJOCASE	The Growth in Number of COVID-19 Weekly Confirmed New Cases in Jordan
GWCASE	The Growth in Number of COVID-19 Weekly Confirmed New Cases in the World
GWDEATH	The Growth in Number of COVID-19 Weekly New Deaths in the World
VIX	Chicago Board Options Exchange Volatility Index
OIL	International Brent Crude Oil Price

4.3.1 Dependent Variable

The below paragraphs are a summary of the literature related to stock market returns during the COVID-19. A dependent variable is "a variable that changes as a result of the independent variable manipulation. It's the outcome you're interested in measuring, and it "depends" on your independent variable" (Bhandari, 2022). The dependent variable of the study is selected to be weekly returns of ASE indices to stand for stock market return. The following studies provide evidence for the relationship between COVID-19 and stock market return.

Pandemic is a natural phenomenon that provides rare opportunities to measure the dynamics of the money response. The widespread impact of the COVID-19 pandemic has become closer to an economic crisis, due to the pressures it causes on public finances, a decrease in the returns of treasury tools, and the discrepancy in the returns of investment funds. The effects of monetary shocks are reflected through portfolios and funds with effective management more than individual stocks or negative indices, which

prompted investors' orientations during the instability of financial markets and the turmoil of sudden events to the natural haven for investments, which is treasury bonds (Mirza et al. 2020).

Concerns about the COVID-19 pandemic and policy measures to control the transmission of the disease contributed to the global shock and plunge the financial markets into a worldwide panic triggered by such a sudden event, due to the breadth and depth of interdependence between contemporary economies. A coronavirus pandemic is an unexpected sudden event that seriously affects everyday life. The close correlations across global financial markets during events such as outbreaks of infectious diseases, and stock market movements become increasingly interconnected, creating negative changes in investor sentiment and fears of uncertainty about future returns on their investment decisions, and thus stock market prices, and negatively affect the stock market returns in all affected countries and regions. Investors fear sentiment is reflected in future revenues and is an mediator and transmission channel for the impact of the COVID-19 outbreak on stock markets, is reflected in a normal reaction it is the selling of stocks, which is reflected in the rapid decline of global stock markets (Liu et al. 2020; He et al. 2020b).

The financial markets were subjected to a severe blow due to COVID-19 pandemic, and the stock markets in Asia, Europe, and North America collapsed. Which the severity of the pandemic worsened the handling of the bad recovery of global stock markets, the reaction of stock markets to the pandemic is not uniform across regions and countries. The increase in the number of COVID-19 cases negatively affected and weakened the stock market in general, due to the pandemic's association with uncertainty, which increased the anxiety of stock markets and its participants. The declining reaction of stock returns to the novel coronavirus is sensitive to the different stages of the virus. A study indicated that uncertainty about the coronavirus in Canada could cause unequal stock market responses to increase or decrease in cases of COVID-19, due to the negative impact of uncertainty about the development of the pandemic in the Canadian stock market. Also, the responses to stock returns are relatively similar in the increase or decrease in cases of the coronavirus in the US, the state of uncertainty negatively affects the return and the small size of the US stock market (Xu, 2021; Udejaja, Isah 2022).

Stock market returns show predictive power for investment and production, because they include expectations about future cash flows and discount rates, and contain information about future economic activities. Stock prices are equal to the expected present value of future net cash flows, as the stock market tends to increase volatility significantly during periods of financial crisis and periods of uncertainty. Stock market volatility is the regular risk that investors face because it reflects uncertainty about future cash flows and discount rates as it is linked to structural change in the economy, the increase in stock market

volatility raises the compensation required by shareholders to bear regular risks because it raises the expected return to the cost of equity capital in the corporate sector, which reduces investment and production (Guo, 2002).

The spread of the COVID-19 pandemic showed serious risks and consequences for financial markets around the world and the US economy, which increased the risks of the global financial market and caused investors to incur significant losses within a short period, with the optimal hedge ratios increasing dramatically in most cases, which means higher precaution costs during the COVID-19 pandemic. The rapid spread of the coronavirus had dramatic effects on global financial markets, and stock markets responded negatively in a proactive manner to the growth and increase in the number of confirmed cases of coronavirus with the decline in stock market returns. The dynamic correlation approach supported the spread of indirect fluctuations between the US and Chinese stock markets, and their continuation even with the lifting of general quarantine restrictions during the first wave of the COVID-19 pandemic, with exposure to unequal shocks due to returns and uncertainty in the outbreak of the disease during the first and second waves with increasing economic uncertainty (Yousfi et al. 2021).

Close correlations across global financial markets have made the effects of the coronavirus shock negative and significant on stock market returns as a natural response due to the turbulence of sudden stock market movements that create a state of uncertainty and fear among investors about future revenues. The stock markets responded negatively in a proactive manner to the growth and increase in the number of confirmed cases and deaths of the coronavirus, with the decline in stock market returns, which include expectations of future cash flows and economic activities. We also expect in the study a negative effect of COVID-19 on the Jordan stock market.

4.3.2 Independent Variables

As an indicator for COVID-19, the explanatory variables of this thesis are selected to be the growth in number of COVID-19 weekly new confirmed cases in Jordan, the growth in number of COVID-19 weekly new confirmed cases and deaths in the world. The evidence for the link between the COVID-19 cases and deaths and the stock market return is provided by the studies listed below.

The increasing number of cases of coronavirus prompted governments around the world to take countermeasures that affected the global financial and economic systems and led to a catastrophic decline in stock markets, as many global markets witnessed at the beginning of the crisis their worst collapse in history. The rapid spread of the coronavirus and the high number of reported deaths has created a state of

panic about the damage the disease is causing to public health and the economies of countries. That reduced ability to predict the future returns of stocks and affected the returns of European stock exchanges (Sun, Li, Cao 2022).

The financial sector is one of the most important sectors in the economy, and most of the previous studies indicate that, the stock market is responding negatively to pandemic diseases. For example, in 2003 the SARS epidemic caused a decrease in stock market returns, and also in 2008, the Ebola outbreak led to a decrease in stock market returns. At present, the outbreak of the new coronavirus in 2019 destroyed the stock returns in some markets in the world, because most of the studies provide evidence that the increase in daily new deaths and daily new cases due to COVID-19 reduces stock returns. The emergence of the impact of the COVID-19 pandemic on stock returns makes investors afraid and worried about hearing news related to the increasing number of new cases and deaths. As a result they may prefer delaying investment until the capital market returns to normal, which may affect stock returns negatively. This study demonstrates how the stock market reacts poorly to epidemic illnesses, and how the coronavirus in Indonesia continues to crash stock market returns. Stock returns are decreased by an increase in daily new cases and deaths (Robin, 2021).

Daily cases and death rates from COVID-19 have increased uncertainty among investors, which has increased volatility in developed and emerging stock markets and led to lower returns. The impact of cases of infection and death rate with the coronavirus on emerging markets differs from the developed markets during periods of increased infection and stability periods of infection. Stock markets tend to overreact to the negative impact of the COVID-19 pandemic and expect markets to correct themselves as information becomes more available, particularly during the rising cases and deaths from the pandemic (Harjoto et al. 2021).

The COVID-19 pandemic outbreak put stock markets into a state of mixed negative shock; COVID-19 cases and deaths had a negative impact on stock returns due to disruptions in the behavior of investors as a reaction to the coronavirus growth in cases and deaths. And based on the findings of previous research, we anticipate negative impacts on Jordan's stock returns from the COVID-19 cases and deaths.

4.3.3 Control Variables

This section provides a summary of priors studies related to the volatility index and oil price which are used as the two control variables in the study. The weekly data is used for the volatility index and the oil price. Control variables are used to evaluate the relationship between multiple variables and to ensure that

the research results can be compared fairly and not deviated. It is the variable that is controlled during the research that the researcher installs directly so that it does not affect the results, or he controls it indirectly through the use of statistical control methods (Voxco, 2022). The following studies provide evidence for the relationship between stock market return and volatility index and oil price.

4.3.3.1 Volatility Index (VIX)

The Volatility Index (VIX) was introduced in 1993 by Chicago Board Options Exchange (CBOE), and is widely followed as an investor “fear index”; and it reflects variations in investors’ emotions. That index provides a benchmark for the expected short-term market volatility and facilitates comparisons of the current VIX level with the historical level, providing reference information useful in assessing the degree of market turmoil, and with which to write futures and options contracts on volatility. The VIX indicator indicates the level of fear in the stock markets and measures the degree of turmoil in the financial markets (Whaley, 2009). The VIX index measures the overall market and investor sentiment whether the mood is positive or negative with investors' risk appetite. The VIX index has a negative relationship with stock returns, so investors' trading strategies depend on it to hedge risks, because it makes their expectations more sensitive to the shocks of uncertainty in the stock markets (Fernandes, Medeiros, Scharth 2014; Simon, 2003).

Creating the VIX index is more difficult than any other indicator because it measures an unobservable quantity, in the field of economics; indicators are used to measure overall trends in price increases or exchange rate movements. The VIX indicator is also used to predict the volatility of stock markets and provides relevant information in interpreting the achieved future volatility, and using indicates volatility products will act as catastrophic hedging tools. The VIX indicator provides two important uses, first, it serves as a reference point for short-term volatility, and second, it is allowed to trade pure volatility. The VIX index acts as a proxy for market risk and measures the expected volatility in a particular market during the next 30 days in general, the increase in the volatility index alerts the market because an increase in the index means an increase in uncertainty, which leads to investor discomfort. The VIX indicator shows that it reproduces all the stylistic facts such as the continuity of volatility, the average retracement, the negative relationship with stock market movements, and the positive correlation with trading volumes. The negative relationship between market returns and volatility is observed during a market decline because the VIX index reflects most of the empirical regularities normally exhibited by stock returns volatility (Kumar, 2010).

The VIX index is related to the level of investor sentiment, whether negative or positive when turmoil occurs in the financial markets. An increase in VIX means large and immediate declines in the returns of financial markets, especially emerging markets. Increasing uncertainty in the US stock market has a much stronger depressing effect on emerging market returns than its lagging and regional returns, as growing VIX index fears reduce emerging market returns by reducing average returns and increasing returns variance (Sarwar, Khan 2016). The volatility of market returns negatively affects the morale and behavior of risk-averse investors, as researchers noted that stock return volatility is high during periods of epidemics and crises, for instance, during the Great Depression (Schwert, 1989).

The shock caused by the COVID-19 pandemic quickly spread to the international financial markets and increased the VIX of the financial markets, after the WHO published new case numbers and the death rate from the coronavirus. For example, the Shanghai Stock Exchange fell by 8% at the beginning of 2020. With different management of the COVID-19 pandemic between countries and different financial market responses, when stock market volatility was high, COVID-19 imposed a stronger impact on stock market volatility in the US and China, where the pandemic showed a significant leverage effect. The COVID-19 pandemic was the main cause of the sharp volatility in the US stock market, outweighing the impact of fluctuations in crude oil prices (Gao, Ren, Umar 2021).

Global stock markets witnessed the fear of the coronavirus and unprecedented declines amid panic and uncertainty to predict future stock prices, the pandemic had a much greater impact on the volatility of the American stock market and changes in trading volume compared to other similar diseases such as Ebola. The number of COVID-19 cases and deaths has increased expectations of volatility and caused a significant drop in stock returns such as the volatility of the Dow Jones and S&P 500. The study confirmed that in the first quarter of 2020, the size of the negative effects of VIX on stock returns increased by three times (Onali, 2020).

The VIX index reflects the sentiments of risk-averse investors and the level of fear in stock markets and measures the degree of turmoil in financial markets. Sentimental investor behavior shows a negative correlation with stock market returns and makes investors more sensitive to shocks and uncertainties in financial markets. The VIX Index is used to predict stock market volatility and is a hedging and long-term speculative tool, and the VIX Index acts as a proxy for market risk and measures the expected volatility in a particular market and an increase in VIX indicates an increase in uncertainty. This confirms the negative relationship between market returns and volatility during the market decline. Therefore, we expect in the study a negative effect of the volatility index on the stock market returns of Jordan.

4.3.3.2 Crude Oil Price

Crude oil is an economic engine in many countries. Oil prices play an important role in influencing real stock returns. Oil price movements explain a large part of the expected error variation in real stock returns compared to interest rates, which shows that the shocks of oil price volatility have effects unequal to global economies (Sadorsky, 1999). The reaction of international stock markets to oil shocks and innovations in oil prices that cause larger changes in stock prices can be justified by current and future changes in real cash flows or by changing expected returns (Jones, Kaul 1996). The reaction of real stock returns corresponds to their response to the supply and demand shocks driving the global crude oil market (Kilian, Park 2009). Among the main determinants of financial markets are oil prices, the study showed that changes in oil prices have an unstable effect on stock markets in the event of noise (media coverage in digital and print media) and fear of the coronavirus, and the correlation has become permanently fixed, and it may be linked to the impact of the COVID-19 pandemic and its discussion in the media (Nepp et al. 2022).

A study conducted by Park and Ratti (2008) positive response to real stock returns to the increase in oil prices, in which the shocks of oil price represent 6% of the fluctuations in real stock returns in many European countries. In the US, the increased volatility in oil prices leads to a decrease in real stock returns. The contribution of oil price shocks to volatility in real stock returns is greater than the contribution of interest rates to the US and most other countries because the increase in oil prices is associated with a significant increase in the short-term interest rate, which confirmed some evidence that positive and negative oil price shocks have disproportionate effects in European oil importers. The oil prices had negative effects on US stock returns during the deflationary period of the global financial crisis, but in the recovery period later after mid-2009 and with the stability of oil stocks, the response of US stock returns was positive to oil prices, as US stocks responded positively with expectations of recovery in the whole world (Mollick, Assefa 2013).

The continuation of coronavirus outbreak has caused unprecedented effects of volatility in US stock markets and uncertainty in economic policy because the irresistible drivers of the US stock market are news related to oil prices and the outbreak of COVID-19 pandemic. At the beginning of the outbreak of the COVID-19 pandemic, the prices of crude oil (West Texas Crude) fell sharply after the Saudi authorities offered oil price reductions between 6 to 8 dollars to major clients in the US, Europe, and Asia, which constituted a decline in stock markets around the world as a result of oil price war and the fear of

the number of cases and deaths from the coronavirus. Oil markets may recover faster through negotiations with the OPEC alliance led by giant oil producers or other solutions (Sharif, Aloui, Yarovaya 2020).

Crude oil and stock markets changed their pattern before and after the announcement of the COVID-19 pandemic. The shock caused a sharp rise in uncertainty, and investors incurred heavy losses in a short period due to the drop in oil prices, because understanding the return and volatility caused by the shock COVID-19 is vital for investors to avoid risks when investing. News related to the COVID-19 and negative oil prices affect oil prices in light of high volatility, which led to decrease in the prices of futures contracts for West Texas Intermediate crude, and affected the global demand and supply for crude oil (Zhang, Hamori 2021).

Crude oil is an important resource in all countries; Jordan is a crude oil importing country, which relies heavily on oil to meet its energy needs for various activities. Oil prices are determined by the supply and demand for petroleum-based products, so it is unpredictable how stocks will react to changing oil prices. Changes in the oil prices have a significant impact on the overall economy, inflation, exchange rate, corporate profits, and other economic variables due to their extensive use as a critical input in the production process, and as a final consumption good. From a microeconomic perspective, crude oil is an important input in the production process, so when oil prices rise, production costs will rise and will negatively affect margins and cash flows, and consequently stock prices. From a macroeconomic perspective, oil prices may affect stock returns through the discount rate (inflation rate and interest rate together). The explanation for this is that high oil prices lead to inflationary pressures that push the central bank to raise the interest rate to meet the pressures and thus reduce stock returns. However, high oil prices can have a positive impact on the stock market in oil-exporting nations due to income and wealth effects, as well as when oil prices raise government revenues. Consequently, the rise in prices leads to an immediate transfer of wealth from the oil-importing countries to the oil-exporting countries. Government spending on purchasing goods and services raises the level of economic activity and improves the stock market returns in these countries (Muhtaseb, Al-Assaf 2017).

Understanding the behavior of risk dynamics between oil revenues and the global stock market is critical to making market decisions such as energy hedging and risk management strategies. The global financial crisis showed that there is a great correlation between oil prices and the returns of the Jordanian Stock Exchange, where investors achieved great diversification benefits and higher advantages by diversifying portfolio investments between the two markets and keeping oil in their stock portfolios, by merging crude oil with Jordanian stocks in one portfolio. The Jordanian stock market was led by risks in

the oil market during the spread of the impact of the global financial crisis on the oil markets. The weak demand and the economic stagnation negatively affected the prices of crude oil, and investors in the Jordanian Stock Exchange began to be in a state of increasing uncertainty, which led to great risks in the returns of the stock market, and the variance of returns in the oil market raised the concern of over-sensitive investors in the frontier market in Jordan. The research paper confirmed that the risks of holding stocks are more affected by the decline in oil prices than by the increase in oil prices, which means that changes in oil prices have disproportionate effects on stock return variations (Bouri, 2015).

Due to its broad usage as a main basis in the production process and as a final consumer commodity, crude oil plays a significant role in the financial markets and economies of nations all over the world. For this reason, we are interested in analyzing the crude oil variable in this study. The responsiveness of real stock returns and the stability of stock markets are significantly impacted by sudden occurrences, such as the COVID-19 pandemic that caused supply and demand shocks in the world's oil markets. The coronavirus outbreak and economic policies are causing fear and uncertainty in the behavior of investors and stock market participants, changing their behavior and incurring huge losses as a natural reaction for investors to avoid taking risks when investing because oil shocks and the rise in the flexibility of oil prices cause greater changes in stock prices that are more unpredictable. Therefore, we expect in the study a positive effect of the oil price on the stock market returns of Jordan.

4.4 Data Analysis

The following section will present data analysis for descriptive statistics and the correlation matrix for the selected variables of the study.

4.4.1 Descriptive Statistics

Sample descriptive statistics for selected variables of the full sample are shown in Table 3, revealing the mean, median, standard deviation, minimum and maximum values for all the regression variables used in the analysis for the period between May 17, 2020, and January 17, 2021.

Table 2: Descriptive Statistics

	IRJ	GJOCASE	GWCASE	GWDEAT	VIX	OIL
Mean	0.0034	0.3256	0.0571	0.0314	26.1811	44.3722
Median	0.0017	0.1257	0.0551	0.0309	25.3400	43.1450

Maximum	0.1084	3.3226	0.1933	0.2030	38.0200	55.9900
Minimum	-0.0855	-0.7053	-0.1259	-0.0986	20.7900	35.1300
Std. Dev.	0.0212	0.8004	0.0704	0.0648	4.3712	5.2150

Following the data analysis as shown above in Table 3; provided the summary descriptive statistics for the weekly returns of all variables used in the analysis. The statistics of the full sample for all indicators show that the average returns for all indices is 0.003, with a maximum value of 0.10, while the minimum return value is -0.08. This means the behavior of average returns fluctuates weekly between negative 8 percent and positive 10 percent. The average of 0.32 percent for GJOCASE indicates that confirmed new COVID-19 cases grow by 0.32 percent weekly on average. Moreover, while the maximum mean value of GJOCASE is 3.32, the minimum value is found to be -0.7. On the other hand the average of GWCASE is determined to be 0.05, with a maximum value of 0.19 and, minimum value of -0.12. When the growth in weekly confirmed new death figures in the world examined, it is seen that the average weekly growth is 0.03 during the analysis period. Additionally, the maximum and minimum values of GWDEATH are 0.2 and -0.09, respectively.

The descriptive statistics for the control variables indicates a mean value of 26.18 for VIX, with maximum and minimum values of 38.02 and 20.79, respectively. On the other hand, the mean value of OIL is 44.37, with a maximum value of 55.99, while the minimum value is 35.13. Maximum and minimum present the greatest positive and greatest negative returns. The median can be used to determine an approximate average and is the middle observation, while the average median returns for all indices are 0.001. Moreover, the average standard deviation in weekly returns for all indices are 0.02, which reflects the risk indicator and used to evaluate the statistical dispersion around the mean, the higher the volatility of returns, the higher the risk (Guo, Wang 2008).

4.4.2 Correlation Matrix

Table 4 below shows the Pearson correlation matrix of variables utilized in the analysis of the possibility of multicollinearity between all possible pairings of values in the table.

Table 3: Correlation Matrix

	IRJ	GJOCASE	GWCASE	GWDEATH	VIX	OIL
IRJ	1					

GJOCASE	0.01146	1				
GWCASE	-0.16245	-0.01646	1			
GWDEATH	0.08359	-0.12390	0.14124	1		
VIX	-0.17854	-0.08363	0.50642	0.14961	1	
OIL	0.14471	-0.31423	-0.43828	0.08952	-0.59480	1

Table 4 shows the correlation matrix of main variables for all measures, Pearson product-moment correlations representing a linear co-relationship between two bi-normally distributed variables; the coefficient indicates the strength and direction of this relationship, which gives the correlations between each pair of variables (Kozak et al. 2012). The total number of unique correlations possible in a study is equal to $k * (k - 1) / 2$, where k is the number of variables (Bedeian, 2015). As there are 6 study variables in Table 4, there are 15 correlations to examine. The Pearson's correlation coefficient can only take values between -1 and +1; a value of +1 indicates perfect positive association, a value of -1 indicates perfect negative association, and a value of 0 indicates no linear association (Freeman, Walters, Campbell 2011).

The results shows that the direction of the relationship between the two variables, where the growth of Jordan cases positively affects index returns of Jordan, which means increases in GJCASE will cause increase in IRJ. On the other hand, the growth in weekly confirmed new COVID-19 cases in the world negatively affect index returns of Jordan, which means if the GWCASE increases the IRJ decreases. Moreover, the growth in weekly confirmed new COVID-19 deaths in the world positive impact on index returns of Jordan. Correlations for control variables indicate that while, the volatility index negatively affects stock index returns of Jordan, and oil price has positive impact on stock returns.

4.5 Panel Data Methodology

The main methodology of the study is panel data analysis. It will be used to investigate the impact of the novel coronavirus on stock market returns in Jordan. The selected 16 sub-indices listed on ASE will be used as a proxy for stock market returns. Index returns will be calculated from closing index values which will stand for the dependent variable of the analysis. On the other hand, the number of confirmed COVID-19 cases and death figures for the world, and the number of confirmed COVID-19 cases for Jordan, which are proxies for COVID-19 will be used as explanatory variables of the analysis. The goal of the study is to explore the nexus between selected index returns in ASE and COVID-19.

The study also explained that the data of the panel is called longitudinal or cross-sectional time-series data, in which data are collected to assess the behavior of entities (countries, individuals, or companies) over time, as it allows the researcher to control the variables that cannot be monitored or measured, or the variables that change over time but not across entities and variables can be included in different levels of analysis suitable for hierarchical or multi-level modeling (Torres-Reyna, 2007).

Panel data analysis is an essential field in econometrics and multivariate statistics, and regression models are frequently used in the analysis of panel data, despite the limitations that this model contains, it can address problems that cannot be solved when they are standard. It refers to a data set that contains frequent observations about a selected set of variables from a set of control units. The panel data is distinguished in that it contains information about individual and period-specific differences to discover the effects of specific individual variables and to examine the effects of time-limited variables (Biorn, 2016).

Panel data analysis refers to data with repeated observations over time of the same individuals (companies, industries, countries, families) for a variety of time-series econometric situations to facilitate the identification of criteria of economic interest and the ability to control for observable coherent and time-varying heterogeneity. Panel data analysis is the best way to capture heterogeneity across units in central modeling issues, as it tends to focus on modeling and the implications of heterogeneity. Because we deal with different units, the field may expand to include any aspect of econometrics and the use of all its tools with panel data, such as structural equations, dynamics, time series models, discrete choice, selectivity, and unit roots. Panel data also provides the external variance required to determine structural parameters through cross-period comparisons that cover policy changes and include data consisting of time series of independent cross-sections (Arellano, 2003).

Panel data analysis provides many advantages for its ability to control correlated and unobserved heterogeneity over time, its ability to analyze the collinearity between explanatory variables and increase the efficiency of standard economic estimators, as well as to calculate the latent individual variance and measure effects that cannot be detected in another way (Pesaran, 2016).

The panel data analysis is characterized by controlling the heterogeneity of the individual, exploiting the largest variance for more efficient estimation, the dynamics of study modification, determining the effects that the individual cannot detect from the cross-sectional data, improving the measurement accuracy, and using one dimension to infer the other. Panel data techniques address the issue of unobserved heterogeneity that aims to control for unobserved variables that may be biased to estimation,

to avoid the problem of specification of panel models with or without individual effects (Croissant, Millo 2019).

4.6 Empirical Research Models

Three models were developed in empirical analyses with models (1) that aim to verify the effect of the growth in the number of weekly confirmed new cases from COVID-19 in Jordan on the weekly ASE index returns. In addition, models (2) and (3) were estimated to verify the same weekly relationship of growth in the number of new confirmed cases and deaths from COVID-19 in the world for the same period, respectively. In all models, the number of index week observations is 576. The models utilized are displayed in Table 5 with their functional representations, as below.

Table 4: Models Utilized and Their Representations

Model	Functional Representations	Equation No
$IRJ=f(GJOCASE, VIX, OIL PRICE)$	$IRJ_{it} = \beta_0 + \beta_1 GJCASE_{it} + \beta_2 VIX_{it} + \beta_3 OIL PRICE_{it} + \epsilon_{it}$	(1)
$IRJ=f(GWCASE, VIX, OIL PRICE)$	$IRJ_{it} = \beta_0 + \beta_1 GWCASE_{it} + \beta_2 VIX_{it} + \beta_3 OIL PRICE_{it} + \epsilon_{it}$	(2)
$IRJ=f(GWDEATH, VIX, OIL PRICE)$	$IRJ_{it} = \beta_0 + \beta_1 GWDEATH_{it} + \beta_2 VIX_{it} + \beta_3 OIL PRICE_{it} + \epsilon_{it}$	(3)

Where i denote the cross sectional dimension and t denotes the time series dimension;

IRJ_{it} = index returns; whereby stock returns for Jordan index i at week t

$GJCASE_{it}$ = growth in number of confirmed new cases from COVID-19 in Jordan for index i at week t

$GWCASE_{it}$ = growth in number of confirmed new cases from COVID-19 in world for index i at week t

$GWDEATH_{it}$ = growth in number of confirmed new cases from COVID-19 in world for index i at week t

VIX_{it} = volatility index at week t

$OIL PRICE_{it}$ = oil price index at week t

ϵ_{it} = error term for index i at week t

β = is the regression coefficient

Regression coefficient parameters β_1 to β_3 represent the sensitivity of the stock index with the growth in the weekly new confirmed cases of COVID-19 in Jordan and the growth in the number of new confirmed cases and deaths from COVID-19 in the world, the volatility index, and oil prices, respectively. Where coefficient β_0 represent constant, the coefficient β_1 represents the measures response to change in expected stock returns associated with an increase in confirmed cases and deaths from the coronavirus. If coefficient β_1 is negative and statistically significant, then there is a negative relationship between stock returns and the coronavirus. β_2 parameter measures the response of stock market returns to increased volatility index, which stands for the measure of fear in the stock markets. Whereas, the coefficient parameters β_3 measures the changes in crude oil prices and the response of stock returns to expected changes.

5. EMPIRICAL FINDINGS

In this section of the thesis, the results of the empirical analysis will be presented in a systematic way. The discussion of tests and results of each of the three equations that were discussed previously will be presented separately.

In order to identify the estimator to be applied for each of the models, numerous tests are run. Firstly, the Variance Increasing Factor (VIF) test is conducted to determine the degree of collinearity. Secondly, Likelihood-ratio (LR) test is conducted to assess the existence of unit and time effects for being able to decide the model to be used. Finally, heteroscedasticity test is a systematic pattern in the errors, used for checking heteroscedasticity in case of a deviation from the normal distribution where the standard deviations of a predicted variable are monitored over different values of an independent variable.

5.1 Model 1: The Impact of Covid-19 Cases in Jordan on ASE

The aim in this model to investigate the impact of growth in the number of COVID-19 weekly confirmed new cases in Jordan (GJOCase) on weekly index returns of selected indices in ASE. Moreover how the variables namely; the volatility index (VIX) and international Brent crude oil price (OIL) are influential on stock returns will also be controlled. To decide the appropriate estimator to understand the relationship between the variables of interest the following tests are conducted.

Variance Increasing Factor (VIF) Test

It is a method for determining the degree of collinearity in the regressions of an equation. The VIFs, on the other hand, represent the degree of variation in the regression coefficient estimate produced by collinearity with other regressions.

Inflation coefficients of variance are classified into two types: (centralized and Un-centered). The centered VIF is the variance of the parameter estimate from the original equation divided by the variance of the parameter estimate from an equation with only that regression and constant. The Un-centered VIF is the variance of the coefficient estimate from the original equation divided by the variance of the coefficient estimate from an equation with just one (not constant) regression coefficient. It is worth noting that the centered VIF value does not exist when the model is evaluated without the constant (Thomsen et

al. 2013). It may be put to the test using the Variance Increasing Factor (VIF). If the VIF value is less than 5, it indicates that there is no multicollinearity.

Table 6: VIF Test for Model 1(Cases of Jordan)

Variables	Coefficient Variance	1/VIF
GJOCASE	1.95	0.51
VIX	1.77	0.57
OIL	1.27	0.79
Mean VIF		1.66

The results in Table 6 demonstrate that all VIF values are less than 2, and this indicates that there is no multiple linear relationship in the model.

Unit and Time Effects Test

The likelihood ratio (LR) test assesses the existence of unit and time effects for being able to decide the model to be used and is a hypothesis test in which two distinct maximum likelihood estimates of a parameter are compared to determine whether or not to reject a parameter constraint. The likelihood ratio test is based on two separate ML parameter estimations. The solution to the unconstrained maximum likelihood problem yields the first, unrestricted estimate. The solution to the constrained maximum likelihood problem yields the second, restricted estimate (Taboga, 2021). The unit effect causes autocorrelation in the error term. However, in the classical model, since there is no distinction among the units, the correlation between units is not analyzed. In the panel data analyses, if there is no unit effect in the model, the autocorrelation is also expected to be decreased.

Mixed-effects regression models are a great tool for linear regression models when your data contains both global and group-level trends (Vivaldi, 2019). Mixed-effects regression models are more flexible since they include all situations in the study. The use of mixed-effects regression models effectively captures extraordinarily large, unobserved heterogeneity that cannot be addressed adequately by simply introducing variables in linear mixed models (Liu, 2016).

Table 7: Mixed-Effects ML Regression for Model 1(Cases of Jordan)

Return	Coefficient	Std. Err	z	P> z
GJOCASE	0.00065	0.0015107	0.43	0.667
VIX	-0.0006403	0.0003269	-1.96	0.050
OIL	0.0003	0.0002877	1.04	0.297
Cons	0.0065742	0.019737	0.33	0.739
Prob > Chi2	0.0038		Min	576
Log likelihood	1415.5274		Max	576
Wald chi2(3)	13.40		Average	576.0

Table 7 shows the result for the unit and time effects test. Since the Chi^2 probability which is 0.0038 and less than 5% significance level H_0 hypotheses should be accepted. It means the model does not have any unit or time effect, therefore the model is classical.

Heteroskedasticity Tests

Heteroskedasticity is a phenomenon where the standard deviations of a predicted variable are monitored over different values of an independent variable or as related to prior time periods (Ai, Norton 2000). And is a systematic pattern in the errors where the variances of the errors are not constant. It occurs when the variance of the error terms differs across observations, rather than being the same for each individual person (Dutcă et al. 2022).

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity helps in detecting the presence of heteroscedasticity. And it could not function effectively on the non-normally distributed dataset and on a small sample size (Olson, 1976). For a P-value of 0.05, the null hypothesis is normally rejected (Cribari-Neto, Zarkos 1999). If the P-value that corresponds to Chi-Square test statistic with P (the number of predictors) degrees is less than some significance level ($\alpha = 0.05$) then reject the null hypothesis, and there is heteroscedasticity (Trawiński et al. 2012).

White test is a statistical test that establishes whether the variance of the errors in a regression model is constant, and is used to identify heteroscedasticity errors in regression analysis (Kaufman, 2013). The null hypothesis for White's test is that the variances for the errors are equal. In math terms, that's: $H_0 = \sigma^2_i = \sigma^2$.

To determine the existence of heteroscedasticity in situations when there is a deviation from the normal distribution (Tatoğlu, 2020); it is recommended to test heteroscedasticity for Model 1 using one of the two alternative tests indicated below:

1. Breusch-Pagan / Cook-Weisberg Test

- H_0 : Constant variance

Variables: fitted values of return

$$\text{Chi}^2(1) = 0.01$$

$$\text{Prob} > \text{Chi}^2 = 0.9261$$

This means that we can accept the null hypothesis, meaning there is no heteroskedasticity.

- H_0 : Constant variance

Variables: GJOCase, VIX, Oil Price

$$\text{Chi}^2(3) = 1.16$$

$$\text{Prob} > \text{Chi}^2 = 0.7618$$

This means that we can accept the null hypothesis, meaning there is no heteroskedasticity.

2. White's Test

White's test for H_0 : Homoskedasticity

Against H_0 : Unrestricted heteroskedasticity

$$\text{Chi}^2(9) = 7.78$$

$$\text{Prob} > \text{Chi}^2 = 0.5565$$

It was also tested by Cameron & Trivedi's decomposition of IM-test. The results were demonstrated in Table 8 as follows:

Table 8: Cameron & Trivedi's Decomposition of IM-Test for Model 1(Cases of Jordan)

Source	Chi ²	Df	P
Heteroskedasticity	7.78	9	0.557
Skewness	6.23	3	0.101
Kurtosis	9.51	1	0.002

Total	23.52	13	0.0358
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Table 8 displays the findings of the White test and the Cameron-Trivedi test. Based on the test result it can be stated that, H_0 can be accepted which indicates that the results do not support the occurrence of heteroskedasticity in the model. According to the findings of all alternative tests, including the Breusch-Pagan /Cook Weisberg and White tests the model is not heteroskedastic.

According to Tatoğlu (2020) in the panel data analyses, if there is no unit effect in the model, the autocorrelation is expected to be decreased. Moreover, normally for each term, the unit effect causes autocorrelation in the error term. However, in classical model, since there is no distinction among the units, the correlation between units is not analyzed.

Ordinary least square (OLS) is one of the appropriate estimators for the analysis when the model is classical (Tatoğlu, 2020). Together with the above test results which indicate that the model is free from deviations of the assumptions, the first model (Cases of Jordan) can be estimated as follows:

Table 9: Regression for Model 1 (Cases of Jordan)

Variables	Coefficient	Std. Err	t	P> t
GJOCASE	0.0006122	0.0012	0.50	0.617
VIX	-0.0006467	0.0003	-2.44	0.015
OIL	0.000295	0.0002	1.27	0.206
Constant	0.0070017	0.1600	0.44	0.662
R2		3.46%	F	6.83
Adj R2		2.95%	Prop > F	0.0002

Table 9 above displays the regression equation of returns for the weekly index for Jordan, the value of the coefficient of the independent variable GJOCASE was 0.0006122, meaning that an increase in the value of GJOCASE by one unit leads to an increase in the value of the dependent variable IRJ by 0.0006122 units. However, the relationship between two variables is not statistically significant. The coefficient of the independent variable VIX was -0.0006467, which means that an increase in the value of VIX by one unit leads to a decrease in the value of the dependent variable IRJ by 0.0006467 units. This inverse relationship between index returns and VIX is found to be statistically significant. The coefficient

for oil price indicates that one unit increase in oil price will lead to an increase in the value of the dependent variable IRJ by 0.000295 units. But this positive relationship is not statistically significant. As the coefficient of the estimate constant 0.0070017 appeared, this means that if the coefficient value of the independent variables is zero, the coefficient of IRJ is 0.0070017.

Through the Table 9, it can be seen that the value of R^2 amounted to 3.46 percent, means that the independent variables in the model are able to explain 3.46 percent of the variance in the dependent variable IRJ. When dividing the value of R^2 by degree of freedom, the Adj R^2 value appeared 2.95 percent and the F-value of the model as a whole was 6.83 and with a probability of 0.0002 and this means that the model as a whole is statistically acceptable.

5.2 Model 2: The Impact of Covid-19 Cases of the World on ASE

The second model in this thesis aims to explore the impact of growth in the number of COVID-19 weekly confirmed new cases in the world (GWCASE), on stock returns of the selected indices in ASE. , Moreover, how the variables namely; the volatility index (VIX) and international Brent crude oil price (OIL) are influential on stock returns will also be controlled. To decide the appropriate estimator to understand the relationship between the variables of interest, the following tests are conducted respectively.

Variance Increasing Factor (VIF) Test

To determine the degree of collinearity in the regressions of an equation, the same model 1 we will use the VIF test in Model 2 (Cases of World), as shown in Table 10 below:

Table 10: VIF Test for Model 2 (Cases of World)

Variables	Coefficient Variance	1/VIF
VIX	1.75	0.571471
OIL	1.61	0.620946
GWCASE	1.40	0.714471
Mean VIF		1.59

Table 10 which show the variance increase factor test results indicaties that the model does not contain any multiple linear relationships, because the VIF value is less than 5.

Unit and Time Effects Test

As in the previous model, we evaluate the unit and time effects test on Model 2 (Cases of world), to determine whether or not to reject the hypothesis, as shown in Table 11 below:

Table 11: Mixed-Effects ML Regression for Model 2 (Cases of world)

Return	Coefficient	Std. Err	z	P> z
GWCASE	-0.0266015	0.0175106	-1.52	0.129
VIX	-0.0005272	0.0003154	-1.67	0.095
OIL	0.0001677	0.0002536	0.66	0.508
Constant	0.0112146	0.0168867	0.66	0.507
Prob > Chi2	0.0009		Min	576
Log likelihood	1416.5493		Max	576
Wald chi2(3)	16.38		Average	576

The unit and time effects test are displayed in Table 11 above. Since the Chi2 probability is 0.0009 and less than 5% significance level H_0 hypotheses should be accepted. It means the model does not have any unit or time effect, therefore the model is classical.

Heteroscedasticity Tests

To discover the problem of heterogeneity or dispersion of the sample data set used in this study for Model 2 (Cases of World), we will use the following two alternative tests:

1. Breusch-Pagan / Cook-Weisberg Test

- H_0 : Constant variance

Variables: fitted values of return

$$\text{Chi}^2(1) = 1.27$$

$$\text{Prob} > \text{Chi}^2 = 0.2604$$

This means that we can accept the null hypothesis, meaning there is no heteroskedasticity.

- H_0 : Constant variance

Variables: GWCASE, VIX, Oil Price

$$\text{Chi}^2(3) = 3.92$$

$$\text{Prob} > \text{Chi}^2 = 0.2699$$

This means that we can accept the null hypothesis, meaning there is no heteroskedasticity.

2. White's Test

White's test for H_0 : Homoskedasticity

Against H_0 : Unrestricted heteroskedasticity

$$\text{Chi}^2(9) = 10.69$$

$$\text{Prob} > \text{Chi}^2 = 0.2978$$

It was also tested by Cameron & Trivedi's decomposition of IM-test. The results were demonstrated in Table 12 as follows:

Table 12: Cameron & Trivedi's Decomposition of IM-Test for Model 2 (Cases of World)

Source	Chi ²	Df	P
Heteroskedasticity	10.69	9	0.2978
Skewness	8.65	3	0.0343
Kurtosis	9.57	1	0.0020
Total	28.91	13	0.0067

Table 12 displays the findings of the White test and the Cameron-Trivedi test. As a result, H_0 can be accepted, indicating that the results do not support the occurrence of heteroskedasticity in the model. According to the findings of all alternative tests, including the Breusch-Pagan/Cook Weisberg and White tests the results do not provide evidence that the model has heteroskedasticity.

Similar to the first model, the second model, which investigates how world COVID-19 cases are influential on stock returns in Jordan, is also estimated by Ordinary least square (OLS) which is one of the

appropriate estimators for the analysis when the model is classical (Tatoğlu, 2020). Based on the results of the above tests, the second model (Cases of World) can be estimated as follows:

Table 13: Regression for Model 2 (Cases of World)

Variables	Coefficient	Std. Err	t	P> t
GWCASE	-0.269085	0.1459	-1.84	0.066
VIX	-0.005289	0.0003	-2.01	0.045
OIL	0.0001651	0.0002	0.78	0.435
Constant	0.114187	0.0140	0.81	0.417
R2		3.99%	F	7.92
Adj R2		3.48%	Prop > F	0.000

Table 13 above displays the regression equation of weekly index returns for Jordan, the value of the coefficient of the independent variable GWCASE was -0.269085. This means that a change in the value of the independent variable GWCASE of one unit results in a change decrease in the dependent variable IRJ of 0.269085 units. This relationship is statistically significant at a 10% level of significance. The coefficient of the independent variable VIX was -0.005289, indicating that a change in the VIX value of one unit causes a change in the value of the dependent variable IRJ of 0.005289 units. This inverse relationship between index returns and VIX is found to be statistically significant at 5% significance level. The coefficient for oil price was 0.0001651, indicates that one unit increase in oil price will lead to an increase in the value of the dependent variable IRJ by 0.000295 units. But this positive relationship is not statistically significant. As the coefficient of the estimate constant 0.0070017 appeared, this means that if the coefficient value of the independent variables is zero, the coefficient of IRJ is 0.0070017.

Through the Table 13, it can be seen that the value of R2 amounted to 3.99 percent, indicates that the independent variables in the model can account for 3.99 percent of the variance in the dependent variable IRJ. The corrected R2 value was found to be 3.84 percent when the value of R2 was divided by the degree of freedom, and the overall F-value for the model was 7.92 percent with a probability of 0.0000. This indicates that the model is statistically sound as a whole.

5.3 Model 3: The Impact of Covid-19 Death Numbers of the World on ASE

Finally, the impact of the growth in the number of COVID-19 weekly new deaths in the world (GWDEATH) on stock return in Jordan is analyzed by the third model. The variables namely; the volatility index (VIX) and international Brent crude oil price (OIL) are also controlled for their impact on stock return. To decide the appropriate estimator to understand the relationship between the variables of interest, the following tests are conducted respectively.

Variance Increasing Factor (VIF) Test

The VIF test for Model 3 (Death Cases of World) represents the degree of variation in the regression coefficient estimate produced by collinearity with other regressions. As shown in Table 14 below:

Table 14: VIF Test for Model 3 (Death Cases of World)

Variables	Coefficient Variance	1/VIF
VIX	1.65	0.605
OIL	1.63	0.613
GWDEATH	1.08	0.928
Mean VIF		1.45

Based on the test results demonstrated in Table 14, it can be stated that VIF values are less than 5, no multiple linear relationships exists in the model.

Unit and Time Effects Test

As in Models 1 and 2, we evaluate the unit and time effects test on Model 3 (Death Cases of World). As shown in Table 15 below:

Table 5: Mixed-Effects ML Regression for Model 3 (Death Cases of World)

Return	Coefficient	Std. Err	z	P> z
GWDEATH	0.0351568	0.0162413	2.16	0.030
VIX	-0.0008545	0.0002981	-2.87	0.004
OIL	0.0001228	0.0002481	0.49	0.621
Constant	0.0191636	0.0168822	1.14	0.256
Prob > Chi ²	0.0002		Min	576

Log likelihood	1417.6389		Max	576
Wald chi²(3)	19.58		Average	576

Table 15 shows the unit and time effects test. Since the Chi2 probability which is 0.0002 and less than 5% significance level, H_0 : hypotheses should be accepted. It means the model does not have any unit or time effect, therefore the model is classical.

Heteroscedasticity Tests

To determine the existence of heteroscedasticity in situations when there is a deviation from the normal distribution; it is recommended to test heteroscedasticity for Model 3 using one of the two alternative tests indicated below:

1. Breusch-Pagan / Cook-Weisberg Test

- H_0 : Constant variance

Variables: fitted values of return

$$\text{Chi}^2(1) = 0.34$$

$$\text{Prob} > \text{Chi}^2 = 0.5627$$

This means that we can accept the null hypothesis, meaning there is no heteroskedasticity.

- H_0 : Constant variance

Variables: VIX, Oil Price, GWDEATH

$$\text{Chi}^2(3) = 0.48$$

$$\text{Prob} > \text{Chi}^2 = 0.9237$$

This means that we can accept the null hypothesis, meaning there is no heteroskedasticity.

2. White's Test

White's test for H_0 : homoskedasticity

Against H_0 : unrestricted heteroskedasticity

$$\text{Chi}^2(9) = 10.11$$

$$\text{Prob} > \text{Chi}^2 = 0.3419$$

It was also tested by Cameron & Trivedi's decomposition of IM-test. The results were demonstrated in Table 16 as follows:

Table 6: Cameron & Trivedi's Decomposition of IM-Test for Model 3 (Death Cases of World)

Source	Chi ²	Df	P
Heteroskedasticity	10.11	9	0.3419
Skewness	6.88	3	0.0759
Kurtosis	9.88	1	0.0017
Total	26.86	13	0.0130

Table 16 displays the findings of the White test and the Cameron-Trivedi test. As a result, H_0 can be accepted, indicating that the results do not support the occurrence of heteroskedasticity in the model. All the tests findings do not support the existence of the heteroskedasticity also in the third model.

Similar to the two models, Ordinary least square is utilized also in the third model (Death Cases of World) can be estimated as follows:

Table 17: Regression for Model 3 (Death Cases of World)

Variables	Coefficient	Std. Err	t	P> t
GWDEATH	0.0351235	0.0139	2.53	0.012
VIX	-0.0000857	0.0003	-3.36	0.001
OIL	0.0001216	0.0002	0.57	0.566
Constant	0.0193016	0.0144	1.34	0.181
R2		4.49%	F	8.96
Adj R2		3.99%	Prop > F	0.000

Table 17 above displays the regression equation of weekly index returns for Jordan. The coefficient of GWDEATH is found to be 0.0351235. This means that increasing the value of GWDEATH by one unit increases the value of the dependent variable IRJ by 0.0351235 units assuming all other factors stay constant. The relationship between the two variables is found to be statistically significant at 5%

significance level. The coefficient of the independent variable VIX is -0.0000857, indicating that increasing the value of VIX by one unit results in a decrease in the value of the dependent variable IRJ by 0.0000857 units. This inverse relationship between index returns and VIX is found to be statistically significant at 1%. The coefficient for oil price was 0.0001216, also appeared, which means that increasing the value of the oil price variable by one unit results in a decrease in the value of the dependent variable IRJ by 0.0001216 units. However, the relationship is not statistically significant.

Through the Table 17, it can be seen that the R² value of 4.49 percent indicates that the independent variables in the model can explain 4.49 percent of the variation in the dependent variable (IRJ). When the value of R² was divided by the degree of freedom, the Adj R² value was 3.99 percent, and the F-value of the model as a whole was 8.96 percent with a probability of 0.000. This indicates that the model is statistically sound as a whole.

6. CONCLUSION

The announcement of the first verified cases of COVID-19 in Wuhan, China in December 2019 seemed to cause a negative reaction in stock markets around the world. As the WHO declared the COVID-19 virus to be a pandemic, the ASE stock indexes were also expected to suffer severely. Many governments have taken measures to combat the pandemic and imposed restrictions that have had negative consequences, such as imposing restrictions on social distancing, closing most sectors, reducing the level of economic activity, restricting transportation between countries, causing significant damage to related sectors, and disrupting the international supply chain. In general, nearly all types of trading activities are affected worldwide. In terms of financial markets, particularly; stock exchanges, stock returns, and cash flows were also negatively affected starting from the beginning of the pandemic. This study attempts to verify the impact of the recent coronavirus pandemic on the stock returns of selected 16 indices of the Amman Stock Exchange (ASE).

Appropriate response measures to the COVID-19 pandemic that slammed the world and local economies raised economic and social costs that impacted societies, policymakers, all financial market players, investors, and individuals. COVID-19 led to a wide fiscal expansion in most nations, which was supported in significant part by expanding public debt during a moment of severe economic recession, creating a market anomaly. Including increased social expenditure and costly containment measures to slow the rapid spread of the coronavirus, which contribute to dealing with the social and economic effects of the COVID-19 pandemic.

The outbreak of the coronavirus shook the global financial markets and caused a state of panic and fear among people, and its impact quickly spread to the financial markets and affected the behavior of investors, and increased the volatility of financial conditions. It has increased hedging rates and costs during the pandemic, and increased market and credit risk for investors. The global financial market contagion prompted a rise in market and credit risks, as well as a drop in investor confidence and a shift in their behavior. This amplified financial market volatility, causing a market anomaly that affected financial markets and the decline in global stock indices and asset prices, and contributed to severe turmoil and severe unequal fluctuations in the currency and bond markets for the returns of global stock markets and the decline in stock prices.

The restrictions and preventive measures imposed by governments on the movement of individuals and commercial activities to prevent the spread of the virus in most of the countries negatively affected the

money and stock markets, investment declined due to uncertainty in future profits, and the percentage of non-performing loans increased due to the closure of commercial activities and companies' failure to pay their obligations.

Previous studies indicate that such pandemic events have negatively affected financial systems around the world, caused high volatility in stock markets, and lead to geopolitical risks. The massive shock of the COVID-19 pandemic also had a negative reaction on global stock market indices and returns, and the closure measures imposed by governments to prevent the outbreak of the pandemic led to turmoil and a decline in morale and investor confidence. Many of the researches conducted in such a short time period, have documented that the continuous growth in the total confirmed cases and deaths from the coronavirus have interacted negatively with the stock exchange returns in most of the company's shares. Based on the literature review summarized in previous sections, it can be stated that the stock's return is more sensitive to new cases of coronavirus than deaths numbers or other cumulative indicators of coronavirus. This reflected negatively on the behavior of investors due to fear and panic among investors due to the uncertainty about the extent of the bad situation.

According to the findings of the analysis evaluating the impact of growth in number of COVID-19 cases in Jordan on selected stock index returns, no significant relationship is detected for the analysis period. For the analysis investigating the impact of world cases, a negative significant relationship between growth in the number of COVID-19 cases in the world and stock returns of Jordan has been found. However, the results regarding the relationship between the growth in the number of COVID-19 deaths in the world and the stock returns of Jordan is found to be positive. The relationship is statistically significant. Even this finding is controversial with the general expectation based on the literature review; one of the rational reasons for such a positive relationship can be explained by the news announcement of the coronavirus vaccine. Regardless of the presence of coronavirus deaths, the news announced by the manufacturers of the coronavirus vaccine and its positive results in reducing the number of cases and deaths, as well as the start of countries importing procedures for the vaccine, reduced investor fear and reflected positively on stock returns. While world cases and death figures have significant impact on Jordan stock returns, it is interesting that any significant impact of COVID-19 cases in Jordan has on its stock returns. These findings question the reliability of the announced data. Even the analysis related with the impact of number of deaths in Jordan due to novel coronavirus on stock returns would be conducted, since the data were not available till August, 2020 it couldn't be realized. With respect to the control variables all the models indicate that stock returns in Jordan affected negatively by the volatility index.

Because when investors expect the risk is too great and they are doubtful of the company's potential profitability, demand for the stock may fall. On the other hand, no significant impact of oil prices on selected index returns has been detected for the period of the analysis.

In light of the research conducted for this study, it can be recommended that it is important for both developed and developing countries to invest in public health develop and improve the quality of life as an economic growth engine. Countries should also reassess the risk management strategy utilized to meet the new and increased dangers posed by the COVID-19 pandemic together with redrafting consistent preventative measures, as steps to reduce shocks and sudden pandemics on individuals, businesses, and governments. To minimize uncertainty caused by events like the COVID-19 pandemic, decision and policy makers in all around the world must develop cohesive economic strategies that promote market liberalization. As the coronavirus's impacts continue, asset managers, individual investors, and businesses must understand how to manage stock market volatility and the systemic risks connected with the virus's spread.

As it is common for most of the research fields, this thesis is also not free from limitations. The first limitation of this study was in terms of data selection. Since the study was limited to the specific Jordanian stock market, it was not possible to generalize the results to other economies. Moreover, due to the lack of daily data disclosures, it is required to use weekly data for the returns of the listed indices in the ASE. Related with the Jordon, further empirical work can be conducted by utilizing different COVID-19 indicators as death numbers to the recent pandemic. Even weekly data is used in this study; the frequency of the analysis can be changed. Both daily and monthly proxies can be utilized in further studies. By day bay, availably of data has increased since the beginning of the coronavirus pandemic. Hence, it can be recommended to conduct similar studies with a longer period of time. Moreover, empirical works can be conducted for other countries and regions to be able to analyze the influence of recent pandemic on different stock exchanges in the world.

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APPENDIX

Appendix 1: Tables

Table 7: The Selected Sub-indices of ASE Used in the Analysis

ASE Financial		ASE Services		ASE Industrial	
Name of the Index	Symbol	Name of the Index	Symbol	Name of the Index	Symbol
Banks	AMBX	Hotels & Tourism	AMHTX	Engineering & Construction	AMECX
Insurance	AMIX	Utilities & Energy	AMUEX	Food & Beverages	AMFBX
Real Estate	AMREX	Transportation	AMTX	Mining & Extraction Industries	AMMEIX
Diversified Financial Services	AMDFSX	Commercial Services	AMCSX	Chemical Industries	AMCIX
		Educational Services	AMESX	Pharmaceutical & Medical	AMPMIX
		Technology & Communication	AMTCMX	Electrical Industries	AMEIX