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**THE IMPACT OF THE COVID-19 PANDEMIC ON
FINANCIAL MARKETS IN DEVELOPING AND DEVELOPED
COUNTRIES**

MASTER THESIS

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Abstract

THE IMPACT OF THE COVID-19 PANDEMIC ON FINANCIAL MARKETS IN DEVELOPING AND DEVELOPED COUNTRIES

The aim of this master thesis is to measure quantitatively and with the support of economic indicators the overall economic effects of Covid-19 Pandemic on developed and developing countries. This master thesis focuses on financial markets and uses the standard event study methodology. Eight sample countries are used for this purpose, four from developed countries and four from emerging economies. The results of the study show that the Covid 19 pandemic led to volatile stock markets and negatively affected stock market returns. Based on the results of the study, it could be said that there is a link between the World Health Organisation's announcement on 11 March 2020 and the decline in stock markets and stock market returns. This master's thesis also examines with the support of economic indicators the effect on reel economy. It provides figures showing that the aviation and automotive industries are the most affected, while in the services sector, international travel is the most affected by the Covid-19 pandemic. On the other hand, the study also provides evidence that sectors such as textiles and pharmaceuticals have flourished.

Key words: Covid-19, pandemic, event study, stock markets, developing countries, developed countries, volatility, WHO, CAR

LIST OF ABBREVIATIONS

GDP: Gross Domestic Product

GNP: Gross National Product

WW1: World War I

FED: Federal Reserve Bank

WTO: World Trade Organization

IMF: International Monetary Fund

WHO: World Health Organization

OECD: Organization for Co-operation and Development

ILO: International Labour Organization

CAR: Cumulative Abnormal Return

AR: Abnormal Return

AAR: Average Abnormal Return

CAAR: Cumulative Average Abnormal Return

FDI: Foreign Direct Investments

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1. Introduction

In the past century, the world experienced financial crises including The Great Depression, The Asian Crisis, and the US Financial Crisis. A Financial crisis impacts the economic outlook, sectoral growth and influences investors behaviour which gets reflected in the stock markets. The newest financial crisis is the Covid-19 Pandemic Outbreak, which originated in the Chinese city Wuhan.

The Covid-19 Pandemic Outbreak influenced the production processes by causing massive disruptions in the global supply chain and global trade. Therefore, the global production output and labour force decreased. World-wide economies and financial markets became troubled, as energy costs increased immensely, while sectors like the aviation and automotive industry reached the brink of collapse. As a result, the global economic outlook looked worse as GDPs and national stock markets declined, while the latter became heavily volatile.

Many studies have been conducted to measure the impact of the Covid-19 Pandemic on national stock markets. There is almost a consensus, that the pandemic hit the national stock markets negatively. This study aims to contribute to the research of the impact by the Covid-19 pandemic on national stock markets by focusing on the national markets of developed and emerging countries.

The objective of this study is to measure specifically the influence on national stock market returns from developed and developing countries, caused by the Covid-19 Pandemic declaration made by the World Health Organization on 11 March 2020. For this, an event study is conducted for the four national stock markets from developed countries (DAX, S&P 500, Nikkei 225, CAC40) and four national markets from emerging countries (BIST30, Bovespa, Shanghai Composite, MOAX). The findings indicate, that the announcement made by the World Health Organization on 11 March 2020, caused volatile stock markets and led to short lasting negative cumulative returns.

The remainder of this paper is structured as follows. In the second section a brief history of financial crises is given. In the third section the general economic impact of Covid-19 Pandemic is shown. In the fourth section, at first a brief literature review is given. Then, the research methodology is described and the event study is presented. Finally, in the fifth section a brief discussion and conclusion are given.

2. Brief History of Financial Crises

2.1 What Is a Financial Crisis?

Financial crises can be described as the collapse of the financial system. According to the existing literature, the effect of financial crises can be identified through various ways. In general, the sudden fluctuation in any good, service, production factor or in the price of various quantities in the foreign exchange market, which occurs beyond the tolerance degree, can be identified as a financial crisis (Ural, 2003). Other way of identifying the effects of financial crises is the common foregoing process during a financial crisis: The rapid sharp increase in asset prices and an increase in the number of credits (Claessens & Kose, 2013).

In a geographical view in regards to the effect of its ranges, a financial crisis can be defined as a global financial crisis (i.e., The Great Depression in 1929 or the financial crisis during 2007-2008) or regional (i.e., financial crisis in the Asia region in 1997) and national financial crises (i.e., 2001 financial crisis in Turkey). For the financial and sectoral view, it is common to distinguish the financial crises between four categories: Currency, banking, systemic and debt crises (Ak & Çinko, 2009, Claessens et al., 2014).

Financial crises do not have a single reason. Usually, there is a process with many parameters and indicators which are leading to financial crises. Some of the parameters, that can lead to financial crises are according to Mishkin as followed: An increase in interest rates, an increase in uncertainty, deteriorations in balance sheets, stock market declines and sudden decrease of price levels (Mishkin, 1991). Today, it is heavily discussed if other indicators which was seen positively before i.e., financial liberalization and globalisation, have negative impacts to the global financial system. Researches and critics raised especially after the financial crisis

in 2007-2008 (Tuncel, C.O., 2010, Berkman, 2011) and today, because of the negative effects of the Covid-19 pandemic to the global financial system.

2.2 Financial Crises from a Historical Perspective

2.2.1 The Great Depression (1929)

The Great Depression is the first global financial crisis the world has ever faced. The effects and outcomes had major influence to the global financial system.

The catalyst for The Great Depression, was the stock market crash in the US. The day which the market crash happened, is even called today as “Black Thursday”. Dow Jones Industrial Index peaked in September of 1929 by hitting a score of 381.17, followed by a continuous decline of three years till 41.22 (Richardson, 2013). Despite different findings amongst researches, there are persuasive evidences that the stock market at that time was overvalued, thus provides implications for a stock market bubble. According to some researches the evidence for a bubble can be seen in the pricing of loans to stockholders and in the valuation of close-end mutual funds (Crafts & Fearon, 2010). Another evidence for an implication of the US stock market bubble is the price increase of stocks from railroad companies, despite the decrease in profitability (Buluş & Kabaklarlı, 2010).

After the stock market crash, several problems occurred. The years between 1929-1933 is a period of banking panics which led to a period of bank crises. Prior this period, the average annual number of bank suspensions in the US during 1920’s was less than 1000, but after the stock market crash there was a continuous increase till its peaked to around 4000 in March 1933 (Federal Reserve Bulletin, 1937). In March 1933, “the bank holiday” was declared in order to regain trust in the banking system (Jabaily, 2013). The cause of the banking crisis was mostly seen in the liquidity shock and also in bank insolvencies related to agricultural products. (Richardson, 2007).

The range of the impact of bank panics remained not national but spread globally. After important banks as the Bank of the United States ceased its operations, it created a chain affect. Several other banking crises as the Austrian, German and the Great Britain bank crises happened. In mid-1931, the Austrian major bank

“Creditanstalt” collapsed. The collapse had a negative impact on the German banks like the “Reichsbank” or the Danat-Bank and put them under pressure (Grossman & Meissner, 2010). The Danat-Bank collapsed, many investors who panicked and lost confidence, withdrew their short-term money from the Reichsbank. In June 1931, in a time interval of 20 days, 840 million Marks were withdrawn from the German Reichsbank which indicated a future collapse (Hodson, 1938). Great Britain, once world’s leading economy, faced withdrawal of funds from its banks which created a currency crisis. The sterling sharply depreciated and got weakened which at the end led to the abandon of the gold standard (Williams, 1963).

During all the crises around the world international production, international trade, international employment got damaged. Just In the US, the GNP decreased, according to the statistical data provided by Friedman and Schwartz, by 30% (Friedman & Schwartz, 1963). According to an analysis, in which 27 countries were included, the real GDP and real exports of the world declined sharply during the years 1929-1932 (Grossman & Meissner, 2010). One cause of the decrease in international production and trade, lies in the deflation of prices, specifically in agricultural products which were over-produced and highly demanded during and post WW1 (Buluş & Kabaklarlı, 2010). The other cause of such a sharp decline in international trade can be seen in the monetary policies of countries, namely the extensive use of protectionist economic policies as increasing import tariffs to protect domestic industries (IMF). These dates are in compliance with the increase of the unemployment rate in the US which peaked in 1933 and reached 25% of unemployment (Friedman & Schwartz, 1963). Similar high unemployment rates, in the same time period, can be witnessed in other industrial countries namely Germany, France, Belgium and Great Britain. (Grossman & Meissner, 2010).

2.2.2 The Asian Financial Crisis Of 1997

The Asian Financial Crisis started as currency crisis, specifically with the depreciation of Thailand’s national currency baht. This event created a regional chain reaction. Its impact spread across other Asian countries as Malesia, Singapore, Indonesia, the Philippines, and South Korea (Berg, 1999).

These Asian countries had experienced, during the 80s and 90s, a huge economic growth which was titled as the “miracle”. The economies of these Asian countries relied mostly on exports and on major foreign capital inflows. With other parameters i.e., with cheap but qualified labour and non-existent trade barriers in international trade, these countries became highly attractive (Durgun, 2016). In coherency with their economic growth through export, these Asian countries adopted a currency basket system. In this system they had pegged their national currencies to the US dollar (Sharma, 2018). The advantage for the currency peg lies in the treaty of Plaza Accord from 1985. With the treaty US dollar got depreciated against the Japanese Yen and German Mark (Sharma, 2018). The depreciation of the US dollar and the following currency peg of these Asian countries, contributed to the competitive advantage for their domestic products in the international market and also increased attractiveness for FDIs and portfolio investments. This situation changed, when the US dollar started to appreciate in mid-1996 (Durgun, 2016).

Before the Asian Financial Crisis, Thailand’s national currency Baht had a currency peg, thus a fixed exchange rate against the US dollar. According to the currency peg, 1 dollar was fixed to 25 baht. The pegged currency with the depreciated dollar, encouraged financial institutions in Thailand to expand their business, to buy real estates and even encouraged to be in action of speculative movements in the Thailand’s stock market (Balaam & Dillman, 2015).

This macroeconomic policy attracted huge numbers of capital inflows. Between the years 1988-1997 the capital inflows tripled (Durgun, 2016). The cause for the high capital inflows was the result of the pegged currency in combination with the discrepancy between the domestic interest rates and the interest rates abroad (Sharma, 2018). Because of the profitability, the financial institutions in Thailand borrowed short-term credits from offshore banks. But as a result, they had an immense increase in their short-term foreign debts (Yürükoğlu, 1998).

After the appreciation of the Dollar in the mid-1996, the national currencies of Asian countries, including Thailand’s Baht, appreciated automatically, because of the pegged currency basket. This situation had a negative impact on Thailand and on other Asian countries which relied heavily on exports for their economy. The appreciation of Baht and other Asian currencies, caused a competitive loss of

Thailand's and on other Asian products in the international market. This led in Asian countries to current account deficits on their balance sheets as a result of decreasing export numbers (Yürükoğlu, 1998).

After the realization that Thailand can't keep their fixed exchange rate against the dollar any longer, investors wanted to withdraw their money from the banks. The major outflow of capital caused a decrease in the dollar reserves of Thailand. The expectations turned out to be true and Thailand abandoned their pegged currency policy against the dollar in July 1997. Baht depreciated immensely against the dollar in which 1 US dollar started to correspond to 50 Baht, meaning a depreciation of 100% (Balaam & Dillman, 2015). The abonnement caused an inflation on foreign products; thus, imports became more expensive. But the most important aspect is that the aggressively borrowed short term credits by financial institutions became unpayable. The whole process resulted in insolvency of many Thai financial institutions, families and individuals. According to the statistical data, the average per capita fell by 25% which wiped out majority of life savings (Balaam & Dillman, 2015)

The depreciation of Baht caused a chain of reaction to the national currencies and stock markets in South Korea, Malaysia, Singapore and Indonesia. A wave of devaluations of currencies and stock markets occurred. According to the statistics provided by Ege (2007), South Korean Won depreciated by 41% while the South Korean composite index fell 50%, Indonesian Rupiah devaluated 71% while the Jakarta composite index decreased 41%, Malaysian Ringgit depreciated by 25% while the Kuala Lumpur composite index declined around 45%.

According to researches the root-cause of the Asian crisis had many parameters and indicators. Yürükoğlu (1998) points out, that the current account deficits of these Asian countries continuously increased between the years of 1990-1996. He provides evidence that these deficits are related to the trade balance deficits, whilst proportioning the current account deficits to the GDP of these countries. This comparison is important since it signifies the ability to pay debts.

As pointed out Thailand as example, they had borrowed many short-term credits. Sharma (2018), Turan (2000) and Berg (1999) showed that the rapid and huge

financial liberalization process of the domestic markets especially after 1980s, with the absence of necessary regulations, made the banking sector, thus the economy in the Asian countries highly fragile to economic disturbances. Berg (1999) argued further and wrote that the huge capital inflows and the investment booms were intermediated by undercapitalized and poorly regulated financial institutions. Lee (1999), Yörükoğlu (1998) and Sharma (2018) also provided statistical evidence of excessive investments especially in the real-estate sector – a sector with relatively low returns, since its investments do not provide long term advantages as manufacturing sectors. They also showed that these excessive investments were one of the parameters which caused the Asian crisis.

All of these indicators in the Asian region and the external factor that the US dollar appreciated, caused the currency crisis in Thailand and initiated the Asian crisis of 1997.

2.2.3 The US Financial Crisis During 2007-2008

The US financial crisis is also called subprime mortgage crisis, because it is heavily related to the expansion of mortgage credits, even to borrowers who did not full fill the criteria to take mortgage credits (Duca, 2013).

During the end of the 90s and early 2000s, the FED continuously decreased the interest rates with the intention to stimulate the economy (Güzel, 2009). The application of such macroeconomic policies, as quantitative easing, helped to establish a stable economy with low inflation and with low interest rates, thus created a time of prosperity in which the household income per capita increased (Bailey et al., 2008). This increase in income created an investment boom in the house sector. Because of the high demand in real-estates, house prices continuously increased and led to a house bubble (Göçer & Özdemir, 2012).

According to the statistical data the credit volume of these subprime mortgages reached 1,5 trillion of dollars before the crisis (Bailey et al., 2008, Göçer & Özdemir, 2012). This amount of subprime mortgages corresponded to a share of 48% of all mortgages (Bailey et al., 2008). However, this status quo was not problematic till the house prices started to decrease. Before that, it was assumed that the prices for real-estate would continue to increase. This meant that even if

interest rates started to increase, those who bought a house with a subprime mortgage could just sell their property for high prices, to pay their loan. But after house prices started to decline, those who took a subprime mortgage, were not able to pay their debts anymore which led to a rise of defaults of credits in the subprime mortgage market (Goodhart, 2008).

The background for the crisis implied problems in the banking sector, namely the increasing activities, which are called “shadow banking” and also the incompetency of credit rating agencies to calculate the risks of securities. Shadow banking, is a form of banking, which takes place outside the traditional banking sector but with a similar purpose. The most important difference is that shadow banks are not regulated as traditional banks i.e., do not have to be covered by a deposit insurance, or do not have to be issued by an institution etc. (Ramskogler, 2015) Related to mortgages, derivative transactions like hedge funds for the mortgage market peaked, but key part is that major share of these derivative transactions were made in an environment of shadow banking (Fidan & Fırat, 2020).

One of these banks was Lehman Brothers, the fourth biggest investment bank in the US with a history of 150 years. As an investment bank, similar to shadow banking regulations, Lehman Brothers was not monitored, like deposit taking commercial banks, and were not obligated to have the same capital requirements (Bailey et al., 2008). Before the crisis, Lehman Brothers also had high number of derivative transactions for the mortgage market (Göçer & Özdemir, 2012) i.e.; hedge funds, repo loans and also borrowings of short-term risky assets. These derivative transactions, which purpose are actually to backing the risk by operating as an insurance, became itself a risk when the crisis started (Fidan & Fırat, 2020). According to Ramskogler (2015), these derivatives were not safe in the first place and argues further, that credit agencies were wrong by rating these as safe assets. He criticises credit agencies for the usage of the same methodology to calculate risks as for single-named corporate finance which was not the case for the securitized bonds during the crisis.

This situation led to a bank run, especially for banks which had a huge number of derivative transactions for the mortgage market. Because of this, many banks faced the danger of collapsing. On 15 September 2008, Lehman Brothers collapsed and

shortly after other big companies, like General Motors, Citigroup, American Insurance Group, Merrill Lynch and Morgan Stanley, gave away signals that they can go bankrupt as well. Because many big companies were at the brink of collapsing, the US government got involved and announced a financial aid package worth of 850 billion dollars (Guillen, 2011).

The collapse of Lehman Brothers, turned the mortgage crisis into a liquidity crisis and created a problem of trust which led that the crisis spread across the globe (Ertuğrul et al., 2012). Because of its impact on economies and financial markets all around the globe, the crisis got branded as the “The Great Recession”. According to the WTO’s report, global trade declined during 2009 by %12,2 which at that time was the highest number after The Great Depression (WTO, 2010). Provided by Freund, total exports decreased by 11%, while total imports also declined by 12% (Freund, 2010). These economic circumstances caused by the crisis, was followed by declining GDP’s in almost all countries, while China, Brazil and India remained as exceptions and performed better during the crisis (Freund, 2010).

According to the IMF report from 2010, the GDP growth of developed countries declined in average by 5% (IMF, 2010; Dullien et al., 2010). Such a sharp decline in the GDPs of developed countries, led to a decrease in the worldwide demand which resulted in the reduction of imports across the globe. The reduction of imports in developed countries led to the decrease of exports in developing countries which resulted in a decline of GDP’s in developing countries (Göçer & Özdemir, 2012). As the IMF report from 2010 statistically provides, the GDP in the developing countries decreased by 6% (IMF, 2010). One of the results, for such a sharp decline, was the increase in the unemployment rate and the decrease in the domestic demand. This caused that many economies in developing countries shrank (Göçer & Özdemir, 2012; IMF, 2010). Awan (2015), who focused his research on the European Union and the G-7 countries, gives a detailed insight about the impact the crisis had. His study shows that several countries in the European Union had a decline in their GDP. According to his findings, the borrowing costs, public debt, financial insecurities within European Union increased, while salaries received a cut.

These findings correspond to the IMF report from 2009, which gives information that manufacturing, exports and the stock markets decreased, while the unemployment and inflation rate grew (IMF, 2009).

3. Financial Crisis of Today: Covid-19 and Its Economic Impact

3.1 Covid-19 and Possible Economic Impact of Pandemics

On 31 December of 2019, Chinese authorities reported cases of an unknown virus in the Chinese city Wuhan. One week later the Chinese authorities gave a statement, which explained, that the virus is a new type of a coronavirus (Şenol, 2020). On the 11 of January, the first death, due to coronavirus was reported. The National Health Commission of China announced on 12 January that the coronavirus spread from the Chinese seafood and poultry market (Taylor, 2020). Between 12-20 of January, Thailand and South Korean authorities announced the first cases of coronavirus (WHO, 2020).

After it was discovered that the coronavirus can spread by human-to-human transactions, the Chinese City Wuhan was put under a lockdown. As the indications showed that the situation worsened, the WHO announced worldwide that the coronavirus outbreaks will be handled as a Public Health Emergency of International Concern (CDC, 2022). On 11 February, the WHO stated that it will use the name “Covid-19” as an acronym for the coronavirus outbreaks to prevent confusions (Taylor, 2020; CDC, 2022). Just three days later, France became the first European country which announced the first death, due to Covid-19 (Taylor, 2020). As the Covid-19 started to spread globally, the WHO raised its coronavirus threat assessment to the highest level of emergency (Loyalace Jr., 2020). As the number of Covid-19 cases increased sharply and because 114 countries reported cases of Covid-19, the WHO announced on 11 March that the Covid-19 will be treated as a worldwide pandemic (Şenol, 2020).

As today, the total confirmed Covid-19 cases globally is around 640 million and the number of confirmed total deaths because of Covid-19 is stated to be around 6.62 million of people (Our World in Data, Total confirmed Covid-19 cases). According to the official numbers, the highest reported Covid-19 cases were reported in the US with over 100 million cases. The other highest numbers were

reported respectively in India as 44 million, France as 37 million, Germany as 36 million, Brazil as 35 million, South Korea as 26 million, Japan and Italy as 24 million, UK 23 million, Russia as 21 million (Worldometer, 2022).

Before Covid-19, the world faced similar diseases as Sars or Mers and other epidemics which had a global range and impact, even though not as the magnitude of impact Covid-19 had. Regardless, such similar experiences gave an estimation of what the world can expect regarding the global economy, when faced an epidemic.

The study by Boissay and Rungcharoenkitkul (2020), in which they analysed prior epidemics, showed two main headlines of what epidemics can cause to the global economy. First, they argue that the estimated costs of epidemics vary according to its impact, effect of range and also to measures and policies by authorities of how to keep the epidemic under control. Second, they show that epidemics have an effect on supply and on demands, as they imply a decline in manufacture and disruptions in the supply channels. They argue further and state, that workers in a company may face limited social interactions which would lead to a reduction of workforce. Such reduction, as they indicate, can cause a chain of events as decrease in income which could lead to a decline in consumption. Decline in consumption would result in a decline of economic growth. According to the study of Jorda et al. (2020), which focuses on economic consequences of pandemics in general, provides other expectations for a pandemic. As the study shows, other expected economic outcomes for pandemics are low interest rates which is related to human behaviour as people tend to do precautionary savings and tend to invest less due to gloomy investment opportunities.

As provided a short timeline of Covid-19 and reviewed literature of possible effects of pandemics in general, the next section will focus on the global economic impact caused by the Covid-19 pandemic and will examine the effects on reel economy, goods and services and financial markets.

3.2 Covid-19's Impact on Real Economy and Its Effect on Goods and Services

As discussed in the section 3.1 the possible impacts of pandemics in general, the Covid-19 pandemic had similar impacts on the global economy as other pandemics the world faced.

As the WHO declared Covid-19 as a worldwide pandemic and as the number of infected people increased rapidly, countries across the world had to use containment measures to keep the pandemic under control. Even though the containment measures and related policies varied from country to country, the world went through similar experiences. These experiences include contact tracing, isolation and quarantine for people, reduction in mobility and social distancing for self-defence (Deb et al., 2020). As conditions worsened, much more drastic measures as policies were taken. These containment measures, introduced by countries, can be summarized as followed: (1) Closures in workplaces i.e., businesses and factories, (2) prohibition of public events as i.e., concerts etc., (3) restrictions of gatherings i.e., as in restaurants, cinema etc., (4) orders/advices to stay at home as “self-quarantine”, (5) closures and restrictions in public transport, (6) national and international travel restrictions and (7) regional and national lockdowns (OECD, 2020).

These applied containment measures may have helped to keep the Covid-19 pandemic under control, but at the same time they had negative impacts on the global economy regarding global trade, production of goods and services as supply and demand got heavily affected. From the viewpoint of supply, the closures of many businesses and shutdowns of some factories reduced the industrial production heavily and disrupted supply chain channels. From the side of the demand, with the increase of uncertainty due to pandemic, the behaviours of consumers changed as they tend to save more which got mirrored in the decline of consumption and investments during the Covid-19 pandemic (World Bank, 2020). Another reason for the decline in consumption is the increase in the unemployment rate during Covid-19.

3.2.1 Impact on GDP's and World Trade

According to the data provided by the World Bank, the decrease in the economic activity caused almost 90% of countries a decline in their GDP which is a share, that is much more than other financial crises the world ever faced (World Bank, 2022). 2020 was the year in which the pandemic peaked and caused a short recession. The average decline of GDP in these countries during the year 2020 was about 3,40% according to the statistical data provided by the OECD interim report from September 2022 (OECD, 2022). The decline in GDP, varied region to region and country from country, and differentiated between low-income economies, emerging economies and advanced economies (OECD, 2022).

Table 1: Change in GDP growth between 2019-2020

Advanced Economies	2019-Reel GDP	2020-Reel GDP	Change in Reel GDP
United States	19.93	19.25	-3.4%
Euro Area	12.62	11.82	-6.4%
Japan	4.57	4.36	-4.6%
Developing Economies			
East Asia			
China	14.30	14.62	2.1%
Thailand	0.46	0.43	-6.5%
Europe Central Asia			
Russia	1.46	1.42	-2.7%
Turkey	1.00	1.02	2.0%
South America			
Brazil	1.82	1.75	-3.8%
Argentina	0.57	0.51	-10.5%
Middle East			
Saudi Arabia	0.68	0.65	-4.4%
Iran	0.44	0.45	2.7%
South Asia			
India	2.69	2.51	-10.5%
Bangladesh	0.26	0.27	3.4%
Africa			
Nigeria	0.50	0.49	-1.8%
South Africa	0.36	0.34	-6.4%

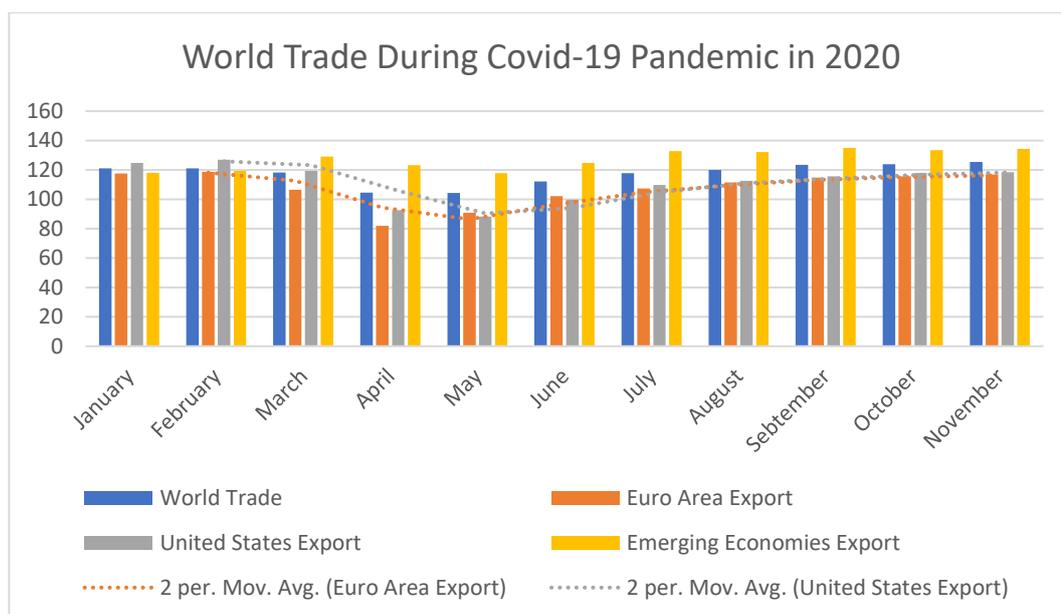
Source: Own calculations based on statistical data provided by World Bank (World Bank Data). *Numbers in billion. Retrieved November 26, 2022, from

<https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=DE-FR-IT>

As the Table 1 shows, the highest percentual declines were seen in advanced economies. The Euro Area has the highest decrease in their GDP. Such a sharp decrease in the Euro Area was expected as countries like Germany, France and Italy, the top three countries in the Euro Area which are leading in the value of sold production, had a sharp decrease in their industrial production index during the Covid-19 pandemic. This resulted in a supply shortage and in a drop in demand. According to the statistical data by Eurostat, Germany holds the highest share regarding the value of sold production with an amount of 27%, followed by Italy and France with 16% and 11% respectively within the Euro Area thus, holding a total amount of 54% (Eurostat, 2021). But during the Covid-19 pandemic, Germany's industrial production dropped by 9.6%, while Italy's declined 11.4% and France's decreased 10.4%. This caused that their sold production value also decreased (Eurostat, 2021). These reductions got mirrored in their GDP's, as their trade got also affected. Germany's GDP declined by 4.6%, Italy's GDP dropped by 9% and France experienced a decrease by 7.9% during 2020, as the pandemic peaked (World Bank, 2022).

As observed in the Table 1, the United States had also a decrease in their GDP. The from the FED provided statistical data shows that the industrial production index fell from 102.48 to 95.28, which represents a decline by 7.1% (Federal Reserve Bank, 2022). This effected the US trade, as it dropped during April, May and June of 2020 heavily by 12-13 points, before recovering to its usual trade index of an average of 125 points (Federal Reserve Bank, 2022). From the worldwide trade statistics, it can be concluded that United States got affected less than the Euro Area, because the peak of the pandemic was reached on April rather than on March 2020, as containment measure policies differentiated country from country.

Figure 1: World trade during the Covid-19 Pandemic in 2020



Source: Own preparation based on CPB World Trade Monitor. Retrieved November 26, 2022, from <https://www.cpb.nl/en/world-trade-monitor-july-2022>

The countries of emerging economies had mostly a decrease in their GDP. This is reflected in their number of exports. but one exception is China, as its GDP grew even during the pandemic by 2.1% (World Bank, 2021). Despite the country of origin of the Covid-19 outbreak, China's industry remained stable as it seen in their industrial production value and export numbers (CPB World Trade Monitor, 2022). As comparison, without China, the average decline of GDP in the countries of emerging economies would be 4.3%, but with China included, it drops to 1.7%. (World Bank, 2021). A strong indicator which shows China's weight in the world trade and for the economy in the countries of emerging economies.

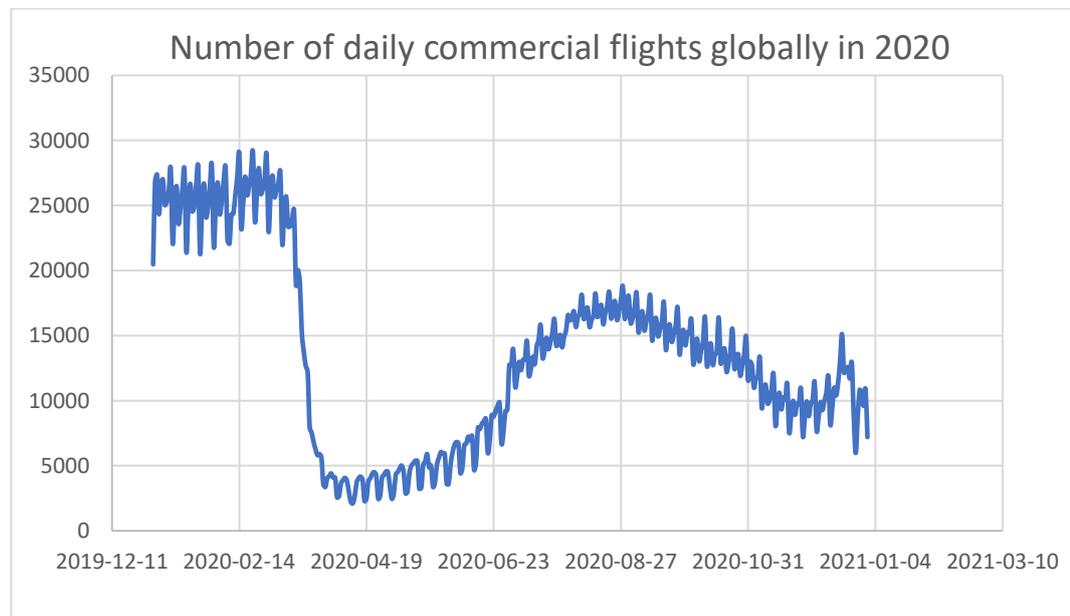
3.2.2 Impact on The Industrial and Service Sectors

As the GDPs declined during the Covid-19 pandemic some industrial sectors got heavily hit therefore, sharply shrank. But in contrast, some industries and sectors had a spontaneous economic increase. This differentiation on the impact side can be explained by the containment measures and also by human behaviour. As example, a decrease in the tourism sector or in the aviation industry was expected, if there is a restriction on international travel. On the other hand, since the core of the economic impact was a health-related problem, a growth in health-related sectors were likely, as people tend and had to buy goods as hand sanitizers or face

masks to protect themselves. Also, the most important, due to the process of manufacturing vaccines by different world-wide companies and investments regarding technology and research facilities, a sector growth in the pharmaceutical sector was almost clear.

The aviation industry, especially national airlines, were amongst one of the heaviest affected sectors during the Covid-19 pandemic. During the year 2020, when the pandemic peaked and the containment measures were strict, the estimated loss of the aviation industry globally is calculated as 230 billion of dollars (Bouwer et al., 2022). The restrictions on international travel caused a decline in the number of flights, thus passenger numbers decreased globally which is the core reason of such heavy losses in the aviation industry. As statistical data shows, between 2019-2020 the number of passengers globally declined by 2.7 billion people which corresponds to a decrease of 61.2% (IEA, 2022). This reduction in the number of passengers is also reflected in the decrease of number of total flights.

Figure 2: Number of daily commercial flights globally

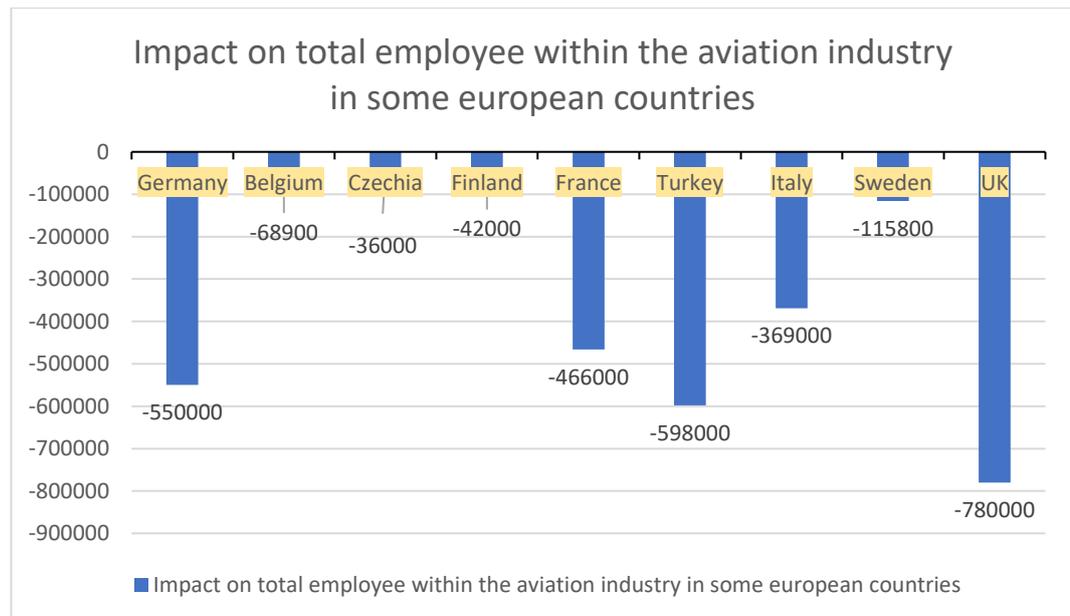


Source: Own preparation based on the data provided by Eurocontrol (2020). Retrieved November 27, 2022, from <https://www.eurocontrol.int/Economics/2020-DailyTrafficVariation-States.html>

As it can be observed from Figure 2, the number of flights globally dropped sharply during the peak of the pandemic (late February – early March). In these extraordinary times, some losses of huge airlines, like the German airlines Lufthansa, were so high that some airlines requested subventions from the state and

governments. As an example, the German government passed a decision in which Lufthansa received a 9 billion Euro subvention during the Covid-19 pandemic (Kraemer et al., 2020). Due to the economic perspective in 2020, many of these airlines also discharged their employees, thus the unemployment rate in the aviation industry increased globally.

Figure 3: Impact on total employee numbers within the aviation industry in Europe



Source: Own preparation based on IATA's statistical database (IATA, 2020). Retrieved November 28, 2022, from <https://www.iata.org/contentassets/c0b84098b8d845d2a01f78f637521dbe/impact-covid-european-aviation-august-2020.pdf>

In some European countries like Germany, France, and UK, just in a period of one year, 400.000 people lost their job in the aviation industry.

Another sector which got hit during the Covid-19 pandemic is the automotive sector, which is coupled with the semiconductor crisis. Due to containment measures China introduced, during the pandemic period and because of the semiconductor crisis, resulted in the shortage of semiconductors as many factories had to shut down their operation temporarily. The Chinese city Wuhan, which was the city where the pandemic outbreak started, is known as the “motor city” as world-wide automotive brands as General Motors, Honda Motor, Nissan Motor, The Peugeot Group, Renault and Toyota Motor have huge manufacturing plants in Wuhan. These world-wide known automotive brands reported that they had to stop their production in their factories in Wuhan, when containments measures were

introduced and also when they faced shortages in semiconductors (ILO, 2022). These temporary closures of automotive plants were not restricted only to China, as automotive plants from big automotive companies as General Motors, Ford Motor and Fiat Chrysler shut all of their plants in the United States temporarily down as well (ILO, 2022).

Table 2: Automotive brands which shut down their operation temporarily during the Covid-19 Pandemic

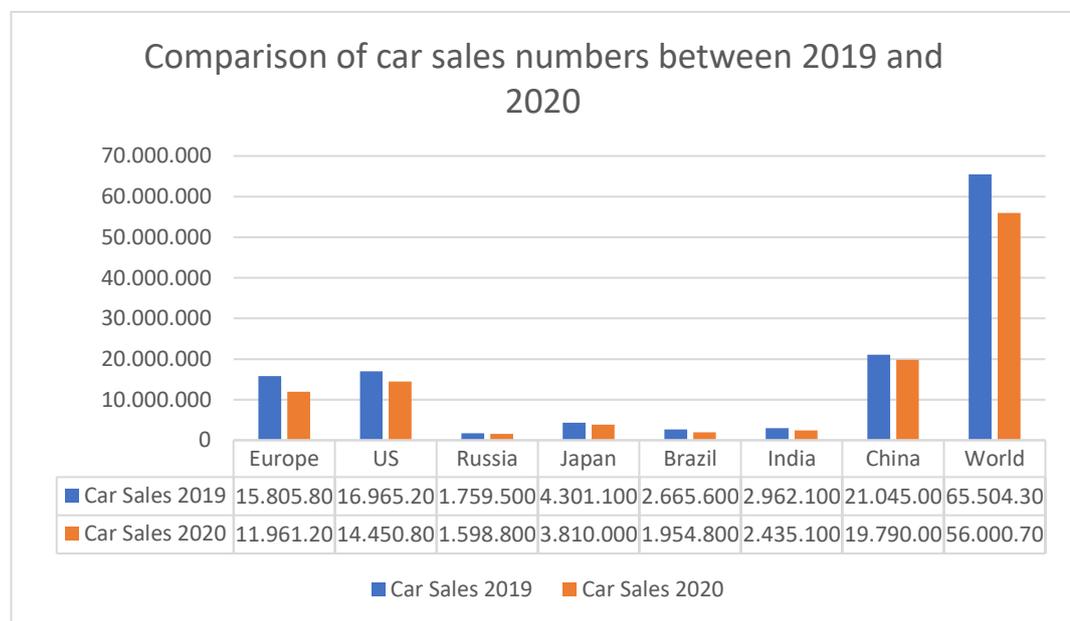
Company	US production shut down date	US production restart date
BMW	March 19	May 4
FCA	March 18	June 1
Ford Motors	March 18	May 25
General Motors	March 18	May 18
Honda	March 23	May 11
Hyundai	March 18	May 4
Kia	March 30	May 4
Nissan	March 20	May 4
Mercedes-Benz	March 23	April 27
Subaru	March 23	May 11
Tesla	March 23	May 11
Toyota	March 18	May 11
Volkswagen	March 21	May 17
Volvo	March 26	May 4

Source: Own preparation based on U.S. International Trade Commission (Coffin et al., 2022)

Due to the reduction of production capacity in the automotive industry, the demand for automotive chips declined accordingly as the automotive plants cancelled their chip orders. At the same time the chip industry which faced production issues too, had to re-organize their resources because of the increasing demand for personal computers, game consoles and smartphones during the Covid-19 pandemic (Wu et al., 2021, Coffin et al., 2022). According to the statistics provided by World Semiconductor Trade Statistics (WSTS), the monthly sales of automotive semiconductors declined between March-May of 2020 by 30% before recovering

in September of 2020 (Osmanbasic, 2021). This statistical data is in line with the research of Burkacky et al. (2021) as they showed that the overall semiconductor demand increased in the world, but that it was the opposite for the automotive industry as the sales for semiconductors in the industry fell during 2020 by 16%. Bad turn of events for the automotive industry happened after lockdown measured softened and plants started to operate again. The demand for semiconductors increased as the production capacity increased, but since the automotive industry cancelled their orders from suppliers, the chip industry prioritised orders from IT, game console industry and such. So, the companies within the automotive industry, which wanted to reach their production capacity before the pandemic, had to wait in the order list for chips. This combination of bad planning and the lack of foresight, caused a decline in automotive industry. As it is seen in Figure 4, the overall sales of cars in the world declined by 9 million of units. This corresponds to a decrease of 14,5% in the world-wide car sales. The heaviest decline happened in Europe and the US, respectively a drop by 24,32% and 14,82%, much higher than the world average.

Figure 4: Comparison of car sales numbers between 2019 and 2020



Source: Own preparation and calculation based on the statistical data provided by VDA (Bekker, 2021)

This economic outlook got reflected in the employment rate. According to the report by the ILO, 42% of manufacturing jobs related to the automotive industry got affected within the European Union which corresponds to a number of affected

workers of approximately 14 million people. According to the same report, around 150 thou. US workers got affected (ILO, 2022). Because of the situation governments offered subventions and financial aids similar to the supports in the aviation industry. As example, Germany introduced a financial package worth of 8 billion Euros to provide help for manufacturing electric cars. France, like Germany, provided also 8 billion Euros for producing electric vehicles, while Spain injected 3.5 billion of Euros to offer state guarantees to the automotive sector and Italy supported households to increase car sales (Klein et al., 2021).

While most of the sectors experienced a decrease, the pharmaceutical sector and the textile industry experienced a growth during the Covid-19 pandemic. In 2020, the pharmaceutical sector grew by 13% in comparison to the prior year (United Nations, 2022) This growth is related to the fact that various pharma companies, like BioNTech, Moderna and Sinovac Biotech, worked to extinguish the Covid-19 virus and produced billions of vaccines (Mathieu et al., 2020). Another reason for the growth is the huge investments made into Covid PCR testing and kits, in order to identify if someone is infected with the Covid-19 virus or not (Popken, 2021).

The textile industry experienced a growth as a result of containment measures. Most of the country's governments brought into force to wear face masks in the public, in order to prevent the spreading of Covid-19, during human-to-human interactions. Before the Covid-19 pandemic there were almost no demand for face masks, but after the pandemic outbreak, the world faced a shortage of face masks as the production capacity of the textile industry was not able to meet the market demand (Beesoon et al., 2020). To overcome the supply shortage of face masks during the Covid-19 pandemic many companies invested in the production of face masks, as some increased their production capacity, by expanding their plants (McIntyre, 2021). This becomes evident, when looked into China's daily production units of face masks, as China was the main supplier of face masks during the Covid-19 pandemic. According to statistical data, China's daily production of face masks, reached 110 million of units per day during the pandemic (QY, 2020).

In Table 3, the overall impact on different sectors is shown which have long-time effects on the market. To summarize some of these long-lasting impacts; energy prices started to increase steadily in 2021, i.e., in the Euro area energy prices got 10

times higher than the normal average. The food-price index increased sharply around the world, i.e., during the pandemic the index increased by 15 points for European countries. Inflation rates started to increase rapidly world-wide with the impact of the pandemic, as in Euro area and in the US inflation rates reached respectively 8.1% and 6.2%. World-wide unemployment increased as industries and service sectors shrank, i.e., the unemployment rate in industrial countries like Germany, France and US peaked as they reached respectively 3.03%, 3,62% and 7,44% during the pandemic period (OECD, 2022).

Table 3: Sector figures from 2020, in comparison with figures from 2019

Sector	2020 first half	2020 second half	Reason
Pharmaceuticals	11%	2%	Investments in vaccines and health technologies
Energy	-29%	-34%	Drop in demand for electricity and fuel because of restrictions to travel
Textiles	26%	29%	Investments to produce face masks and similar
Cars	-29%	2%	Plant shutdowns and semiconductor crisis
Transport	-17%	-17%	Restrictions to use public transport and such
IT	6%	15%	Need for pc and software for remote school and work etc.
Int. Travel	-55%	-70%	Restrictions as containment measures for international travel
Agriculture	-1%	6%	Disruptions in the food supply chain and logistic issues

Source: Own preparation based on UNCTAD database. Retrieved November 28, 2022, from <https://unctadstat.unctad.org/EN/>

3.3 Covid-19's Impact on Financial Markets

Stock markets always get influenced by events which may happen in politics, in economy or they can be affected by a government policy or by a natural disaster etc. According to the importance of the event, stock markets usually show a reaction which can either be positive or negative. This section will focus on the Covid-19 pandemic and will explore the impact on stock markets on selected countries.

3.3.1 Influence on Stock Markets from Developed Countries

Figure 5: Stock markets performances in Germany, Japan, United States, and France



Source: Own creation based on the data from Investing.com. Retrieved December 10, 2022, from <https://www.investing.com/>

Pre-Covid-19, stock markets of developed countries had a trend of an increase, even though the increases were slightly with continuous up and downs. Regardless the economic outcome in overall was seemingly positive, as the increases were continuously, pointing out to a positive economic climate across developed countries. An interesting fact is that the stocks did not have a recession till the end of February 2020, presenting a 2-month gap between the first reported case in China. As can be observed by Figure 5, the recession of the stock markets starts at the last week of February and reaches its peak in March 2020.

Table 4: Developed countries and their announcements of the first reported Covid-19 cases

Country	Announcements of first cases	Dates of first measures
Germany	27. February 2020	03. March 2020
Japan	16. January 2020	03. February 2020
USA	20. January 2020	31. January 2020
France	24. January 2020	23. February 2020

Source: Gortana et al., 2020; CDC, 2022; Kyodo Staff Report, 2020; Bernard Stoecklin et al., 2020

During March 2020, most of the developed countries had already registered their first cases and deaths. Despite announcements of first cases and deaths, due to Covid-19 and even by existing containment measures, stock markets of the developed countries remained, from 31. December of 2019 till 21. February of 2020, strong. This indicates that there was not a movement of panic by investors and traders in their respective stock market. This can be seen in the volatility value of the selected stock markets, as volatility is also a measuring tool to measure the fear and the stress of the market.

Table 5: Volatility calculation for developed markets (I)

Country Stock Market	Daily Volatility	Avr. Monthly Volatility
DAX	0.85%	3.74%
Nikkei	0.85%	3.69%
S&P 500	0.76%	3.17%
CAC 40	0.83%	3.14%
Time Frame: 01.03.2019 - 31.12.2019		

Source: Own calculation on the retrieved Investing.com data. Retrieved December 12, 2022, from <https://www.investing.com/>

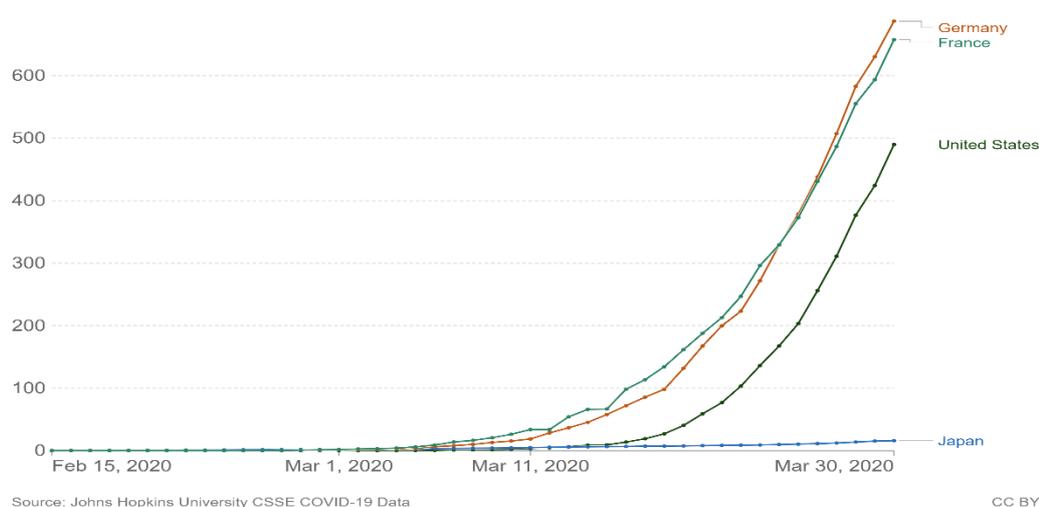
Table 6: Volatility calculation for developed markets (II)

Country Stock Market	Daily Volatility	Avr. Monthly Volatility
DAX	1.14%	4.98%
Nikkei	1.20%	4.97%
S&P 500	0.92%	3.88%
CAC 40	0.81%	3.41%
Time Frame: 01.01.2020 - 21.02.2020		

Source: Own calculation based on the retrieved Investing.com data. Retrieved December 12, 2022, from <https://www.investing.com/>

As can be observed from Table 5 and 6, the daily volatility value and average monthly volatility value is stable, as there are no unusual spikes till 21.02.2020. Like mentioned, the selected stock markets of the developed countries were not affected and influenced by the first cases as not from the first containment measures. When the situation worsened at the last week of February of 2020, as cases and deaths started to increase, stock markets declined as a result of the increased uncertainty. Especially in March of 2020, there was an exponentially increase in the numbers of Covid-19 cases and it was then, when the stock markets started to decline heavily.

Figure 6: Cumulative confirmed Covid-19 cases: Germany, Japan, United States and France



Source: Mathieu et al., 2020

The data in Figure 6 shows, that there might be a correlation between the increasing numbers in Covid-19 cases and the sharp decline of stock markets in developed countries. The possible correlation indicates, that traders and investors started to become worried and anticipated that there will be much heavier containment measures as lockdowns, production issues, travel bans, travel restrictions etc which would affect the social life, but most important firm performances.

Table 7: Volatility calculation for developed markets (III)

Country Stock Market	Daily Volatility	Monthly Volatility
DAX	4.28%	22.23%
Nikkei	3.47%	17.34%
S&P 500	5.41%	27.59%
CAC 40	4.27%	22.18%
Time Frame: 24.02.2020 - 31.03.2020		

Source: Own calculation based on the retrieved Investing.com data. Retrieved December 12, 2022, from <https://www.investing.com/>

The possible correlation, that traders and investors became worried and anticipated heavier containment measures, can be deduced from Table 7. The daily volatility rate which was usually under normal circumstances between in a range of 0.75%-0.90% in the selected developed countries, increased drastically in March 2020. Under the influence of sharply increasing Covid-19 cases, the daily volatility rate in March varied between 3.47%-5.41%. It becomes much more evident, when looked into the monthly volatility rate at the same time period. Under normal circumstances, the average monthly volatility rate in the selected developed countries varied in a range between 3.19%-3.95. However, in March the monthly volatility rate increased sharply and varied between a range of 17.34%-27.59%.

Such a sharp increase of volatility, in comparison to their daily volatility and average monthly volatility rate, makes evident that the possibility of stricter containment measures increased the uncertainty and reluctance amongst investors and traders during March 2020. This negative climate got reflected in the respective stock markets. The German DAX reached its peak on 18. February 2020, but just in a period of one month the German stock market almost crashed and declined by

38.76% during March. The Japanese stock market Nikkei 225 had its peak in January 2020, but just in a period of two months it reached its all-time low on March 19 and showed a decline by 31.28%. The US stock market S&P 500 reached its pre-Covid-19 all-time high in February. But during March, the US stock market reached its lowest point by a decrease of 33.94%. The French stock market CAC 40 faced the same outcome as the other stock markets. It reached its pre-Covid-19 peak in February of 2020, but fell sharply in March and declined in a period of one month by 38.57%.

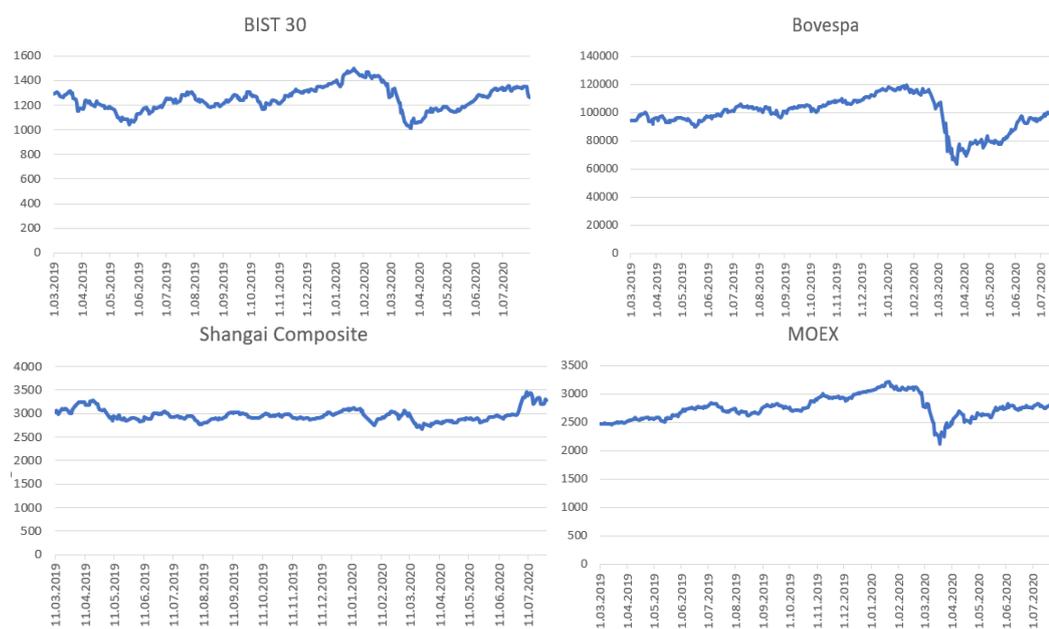
Table 8: Calculation of stock market changes in developed countries

Country Stock Market	Date of highest point	Date of lowest point	Change
DAX	18.February 2020	18.March 2020	-38.76%
Nikkei	20.January 2020	19.March 2020	-31.28%
S&P 500	19.February 2020	23.March 2020	-33.94%
CAC 40	19.February 2020	18.March 2020	-38.57%

Source: Calculation based on the retrieved data by Investing.com. Retrieved December 12, 2022, from <https://www.investing.com/>

3.3.2 Influence on Stock Markets from Developing Countries

Figure 7: Stock markets performances in Turkey, Brazil, China, and Russia



Source: Own creation based on the data from Investing.com. Retrieved December 27 December, 2022, from <https://www.investing.com/>

Like the developed countries the selected developing countries' stock markets, apart from China, tended to increase during pre-Covid-19. On the other hand, China's stock market showed a trend of stability, indicating a very low volatility. In comparison to the developed countries, developing countries experienced a recession earlier than developed countries. As can be observed from Figure 7, the selected developing countries' stock markets started to recess in January of 2020 as the continuous trend of increase stopped, thus became almost stagnant till the continuous decline between February and March of 2020. Even though China is the origin country for the Covid-19 pandemic, the movement in their stock market is an exception in comparison to the other developing countries. The lowest points in the Chinese stock market relates to important dates as the announcement of the first Covid-19 case on 31. December 2019 by the Chinese government and to the announcement by the WHO which declared Covid-19 as a world-wide pandemic (CDC, 2022).

Table 9: Developing countries and their announcements of the first reported Covid-19 cases

Country	Announcements of first cases	Dates of first measures
Turkey	10. March 2020	30. January 2020
Brazil	26. February 2020	16. March 2020
China	31. December 2019	23. January 2020
Russia	31. January 2020	24. January 2020

Source: Cakir, 2020; Chen et al., 2021; Melo et al., 2020; Latypova, 2020

Unlike developed countries, some developing countries announced their first containment measures, when there were no cases of Covid-19 in their countries. In comparison to the developed countries, containment measures affected these stock markets earlier. This can be concluded by the time of their recession. The stock markets of the selected developing countries reached their peak in January, one month earlier than the selected developed countries' stock markets and started to become stagnant, till their continuous decline from February till March. China on

the other hand had almost a constant and stable curve, despite being the origin country of Covid-19. As mentioned, the Chinese stock market showed heavy drops only on important dates as the introduction of containment measures. On the day when the first containment measures got introduced, the Chinese stock market decreased by 7.72%.

For further hindsight and to deduce the stock markets' behavioural activity, the volatility rates, for each stock for the same time period in the developing countries, are shown in Table 10.

Table 10: Volatility calculation for developing markets (I)

Country Stock Market	Daily Volatility	Avr. Monthly Volatility
BIST 30	1.40%	6.18%
Shanghai Composite	1.05%	4.52%
Bovespa	1.11%	4.90%
MOEX	0.70%	3.18%
Time Frame: 01.03.2019 - 31.12.2019		

Source: Own calculation based on the retrieved Investing.com data. Retrieved December 27, 2022, from <https://www.investing.com/>

Table 11: Volatility calculation for developing markets (II)

Country Stock Market	Daily Volatility	Avr. Monthly Volatility
BIST 30	1.36%	5.85%
Shanghai Composite	1.75%	6.52%
Bovespa	1.25%	5.40%
MOEX	0.82%	3.63%
Time Frame: 01.01.2020 - 21.02.2020		

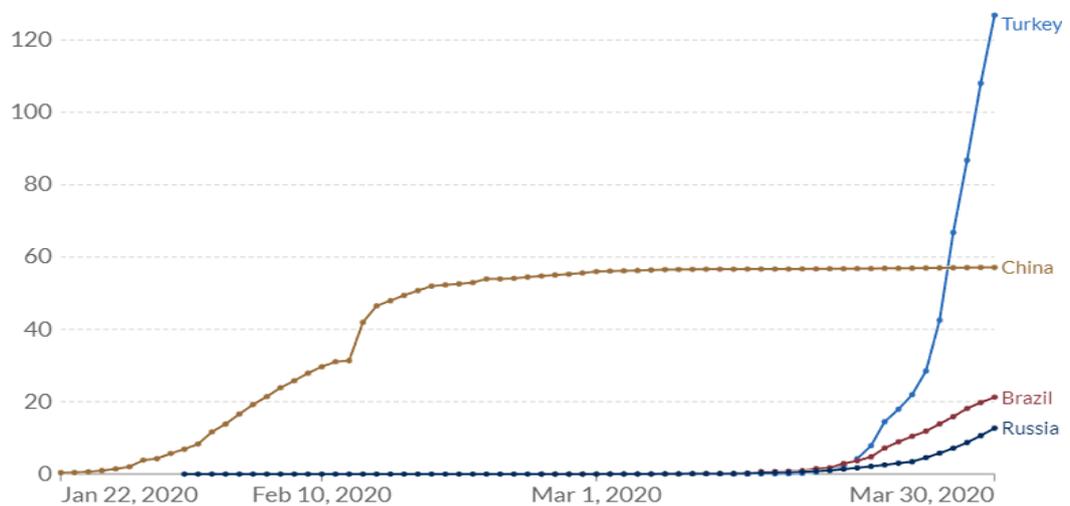
Source: Own calculation based on the retrieved Investing.com data. Retrieved December 22, 2022, from <https://www.investing.com/>

As can be observed from Tables 10 and 11 the volatility rates from the selected developing countries, except for the Russian stock market, are slightly higher than the volatility rates from the developed countries during pre-Covid-19 and at the

beginning of the pandemic. Despite the earlier stock market recession, in comparison to the developed countries, investors and traders behaved similar in the stock market. Only China, the origin country of the Covid-19 pandemic, showed a higher increase in volatility than the average of all selected countries, as fear tend to increase the risk in the stock market. The fact that some Chinese industries, as the chip industry, suffered through factory shutdowns in January-February of 2020 (ILO, 2022), a slightly higher rate than other countries was expected, since industry performances tend to affect the performance of the stock market.

Similar to the developed countries, the economic situation started to get worse at the last week of February. The end of March was when the Covid-19 cases started to increase in developing countries as well, but relatively slower than it was the case in the developed countries. Regardless, with the increase of uncertainty in the economic outcome, the stock markets, of the selected developing countries, started to decline heavily which got reflected in to their volatility rates. This indicates that investors and traders showed reluctance to invest in the stock market, as they anticipated that companies will face major problems with their operations, when heavier containment measures get issued from the governments.

Figure 8: Cumulative confirmed Covid-19 cases: Turkey, China, Brazil, and Russia



Source: Johns Hopkins University CSSE COVID-19 Data

Source: Mathieu et al., 2020

As can be seen in the Figure 8, the Covid-19 cases started to increase during March and this increase impacted the stock markets. Only China, with their heavy containment measures as early lockdowns, had a stagnant number of Covid-19

cases. This situation got reflected in the volatility rates during March. It indicates a similar correlation, which the developed countries had between the increasing Covid-19 cases and behaviour pattern of investors and traders. Similar to the developed countries, the volatility rate increased during March which shows that investors and traders behaved similar, thus became reluctant to invest, as the fear and uncertainty grew. On the other hand, China's early containment measures as lockdowns, which kept the Covid-19 cases constant, forms an exception. Their volatility rate, despite being the origin country of Covid-19, did not increase as much as other countries and even had the lowest volatility rate amongst the selected countries during March, the month, when the World Health Organization declared the Covid-19 as a world-wide pandemic.

Table 12: Volatility calculation for developing markets (III)

Country Stock Market	Daily Volatility	Monthly Volatility
BIST 30	3.09%	16.04%
Shanghai Composite	1.80%	9.37%
Bovespa	7.30%	36.51%
MOEX	3.94%	19.68%
Time Frame: 24.02.2020 - 31.03.2020		

Source: Own calculation based on the retrieved Investing.com data. Retrieved December 27, 2022, from <https://www.investing.com/>

According to Table 12, Brazil's stock market was affected the most from the increase of Covid-19 within the country. As can be observed, till March 2020, Brazil's daily volatility rate was within a range of 1.11%-1.25%, while the monthly volatility rate was between 4.90%-5.40%. But during March, the daily and the monthly volatility rate peaked and reached 7.30% and 36,51% respectively, indicating a turbulent and unstable time in the stock market which is also confirmed by the high decline at their stocks. As mentioned, the Chinese stock market was the less affected stock market, with only a very slight increase by 0,05% in their daily volatility rates between the time period of February-March. This is in alignment with the fact that the early strict containment measures, which kept that the Covid-19 cases constant, had a positive impact on the investors and traders. Interestingly,

the Chinese stock market remained strong when some sectors as the chip industry suffered heavily and faced plant shutdowns in January and February (ILO, 2022). The Turkish and the Russian stock market faced a high increase, much more than the average, in their daily and monthly volatility rates. Regardless, in comparison with the stock market of the selected developed countries, their volatility rates were lower than 4%-5%. This means that the BIST 30 and MOEX performed much more stable in contrast to the stock markets in developed countries.

BIST 30 had its highest point in January 2020, but with the increase of cases and with announcement from WHO, BIST 30 decreased in a time period of two months by 30.69%, similar to the developed countries. The most affected stock market was the Brazilian Bovespa, as also confirmed by the volatility rates. Bovespa peaked on January, but during March the stock market almost crashed and declined by 46.82%, the highest amongst the selected countries. In the same time period, the less affected stock market, despite the factory shutdowns and strict lockdowns, was China's Shanghai Composite, as they decreased only 14.91%. The Russian stock market MOEX, peaked on January and performed till March 2020 like the developed countries and declined by 34.39%.

Table 13: Calculation of stock market changes in developing countries

Country Stock Market	Date of highest point	Date of lowest point	Change
BIST 30	21.January 2020	23.March 2020	-30.69%
Shanghai Composite	13.January 2020	23.March 2020	-14.91%
Bovespa	23.January 2020	23.March 2020	-46.82%
MOEX	20.January 2020	18.March 2020	-34.39%

Source: Own calculation based on the retrieved data by Investing.com. Retrieved December 27, 2022, from <https://www.investing.com/>

As emphasized, the stock markets from developing countries peaked in January, one month earlier than the selected developed countries, thus started earlier to recess. Overall, with the exception of China, the developing countries performed worse than the developed countries.

4. An event study: Covid-19 and the Impact on Selected Countries Stock Markets

4.1 Literature Review

As the world's focus, during the last two years, laid on the Covid-19 pandemic, many empirical studies are conducted and are still ongoing. These researches focus on different economic aspects of the Covid-19 Pandemic, thus showing a broad variety of topics and different statistical methodologies to assess the economic impact.

Jabeen et al. (2022) focused in their paper on the performances of stock market indexes from 34 countries. Mainly stock markets from Europe and Asia. They provided evidence that the pandemic affected the stock markets heavily and pointed out heavy losses of billion dollars during the Covid-19 pandemic. They also showed that most of the stock markets suffered record decreases, especially during March of 2020, but also that stock markets started to recover and regained strength after March.

Baker et al. (2020) tried to explain the unusual market responses from the US stock market towards the Covid-19 Pandemic. They compared, at first, the volatility rates of the US stock market from different economic crises, as The Great Depression or the Black Monday in 1997, with the volatility rates during the Covid-19 pandemic. They also compared the volatility rates of the US stock market during the Covid-19 pandemic with other periods of diseases, as the Influenza pandemic in 1957 or Bird Flu in 1997. They found out that early Covid-19 volatility rates in the US stock market, is similar to other early epidemic phases of other diseases and economic crises.

In addition to the work of Baker et al. (2020), Onali (2020) also focused in his studies on the US stock market and investigated the connection between the stock market returns with the amount of the Covid-19 cases and deaths in different countries. He used empirical methods as GARCH and Var models for his study. He reached the conclusion that only the increase of Covid-19 cases in China, affected the US stock market returns.

He et al. (2020) concentrated in their paper on spill-over effects of the Covid-19 Pandemic, for the specific time period from 30. January till 10. March. For their study they examined stock markets from 8 countries, namely from China, Germany, the US, Japan, France, Spain, South Korea, and Italy respectively. For their empirical part, conventional t-tests and non-parametric tests as Mann-Whitney were conducted. Their statistical results showed that the Covid-19 pandemic had short-term negative effects on the selected countries' stock markets.

Bannigidadmth et al. (2022) examined the relationship between the impact of the Covid-19 Pandemic on stock markets from 25 different countries and their government's policies to contain the pandemic, such as lockdowns and travel restrictions. According to their empirical study they reached the conclusion, that a third of the selected countries' stock markets were not affected by containment measures, while remained stock markets were affected negatively from restrictions.

Bouhali et al. (2021) focused in their study on a similar subject as the study conducted by Bannigidadmth et al. (2022). In their study they tried to evaluate the impact of the Covid-19 pandemic on the forex exchange market, including 12 countries. In particular, they tried to assess the dynamic correlation between the daily Covid-19 contaminations and vaccinations with the forex exchange market in these 12 countries. As a method, they used the DCC-GARCH model. Their findings are in coherency with the results of Bannigidadmth et al. (2022), as they found out that contaminations and vaccinations impacted the economies heavily, especially countries in the eurozone.

Event studies are a standardized methodology for analysing the impact of specific events, therefore this methodology is also used to measure the effects of the Covid-19 pandemic on stock markets. Kılıç (2020) examined in his paper the Turkish stock market returns of sectors between 02.01.2018 – 30.04.2020. He conducted an event study and analysed the stock market returns in four different time intervals. These time intervals are 11. January of 2020 (first death in the world due to Covid-19), 11. February of 2020 (The WHO announcement, that the virus will be called as Covid-19), 11. March of 2020 (The WHO declaration of pandemic) and 11. April of 2020 (Announcement of Turkish government policy for lockdowns within the country).

He found out, that the sectors in the Turkish stock market had only negative CARs after the announcement on 11. March and that other announcements did not have an impact on sectors.

While the work of Kılıç (2020) focused only of one countries' sectors' stock market indexes, Maneenop and Kotcharin (2020) concentrated their research specifically on the global aviation industry and conducted an event study. Their data consisted 50 airline companies from nine countries around the globe. For their event study they chose three reference points, which are 13. January of 2020 (First case of Covid-19 outside China), 21. February of 2020 (Covid-19 outbreak in Italy) and 11. March of 2020 (The WHO declaration). Their empirical results showed, that the CARs of airline companies from UK, Canada and the US were affected the most, as the returns were the worst amongst the other airline companies.

Similar to the work of Kılıç (2020), Maneenop and Kotcharin (2020), Khatatbeh et.al (2020) conducted an event study to see, if they can find a correlation between the CARs of stock market indexes and the first announcements of Covid-19 cases. For their empirical study, they chose, in aggregate, 13 countries from Europe and Asia. They used for analysing the cumulative returns, different reference points for each country, as the first announcements of Covid-19 cases differed from country to country. However, the time interval from the reference point stayed the same for each country. Their empirical results pointed out unusual stock market behaviour for each country, like delays in market reaction, regards the first announcements of Covid-19 cases.

Ji et.al (2022) conducted an event study on the 13 leading stock market indexes. They tried to measure the influence of the Covid-19 pandemic on strong economies in developed countries. In their research, they mainly focused on the first announcements of Covid-19 cases in their respective country. In order to explore the effect, they used short and long time-intervals. Their findings are supporting the results of the work by Khatatbeh et.al (2020) as their studies' results pointed out that there is a significant positive correlation about stock market returns and the number of Covid-19 cases. They also provided results that the Asian stock markets suffered significantly much more than the other stock markets indexes, which are not located in Asia.

Pandey and Kumari (2020), conducted an event study which precisely takes the 11. March of 2020 as a reference point. 11 March of 2020 is the date in which the WHO declared the Covid-19 outbreak as a pandemic. As the other event studies, their findings are based on empirical calculations about cumulative returns in specific time frames. For their study, they chose the most visually hit countries by the Covid-19 Pandemic. For measuring the performance of the stock markets and to be able to compare them with each other, they used a benchmark stock index for the CARs. The benchmark index is the so-called MSCI All-Country World Equity Index. They used for the event study a time from of 30 days, which got split into 15 days before and 15 days after 11. March of 2020. In their analysis, they did not only calculate the significancy of the CARs, but also the CAARs in order to categorize the impact as regions. As similar to the study results by Ji et.al (2020), their analyse reached the conclusion, that the Asian markets got hit the most by Covid-19, and those developed countries got affected much more than the emerging markets.

Eren et.al (2021) took a similar approach and conducted an event study to measure the degree of impact on developed countries' stock markets by the pandemic declaration of WHO on 11. March of 2020. For this matter they used also the MSCI All-Country World Equity Index, as the benchmark Index. They chose 7 different time frames for their study. The shortest one being 5 days before and after the event, while the longest being 20 days before and after the event. For their empirical study, they have calculated the CARs of the stock markets, as other event studies. They went for testing their results significancy with the so-called Patell-Z test. According to their results, the most affected developed country from the Covid-19 declaration by the WHO, was the Austrian stock market, while the least impacted was Hong Kong's stock market index. Their results pointed out, that there is an indication that the announcement of 11. March caused of panic selling in stock markets, thus might be the reason for the rapid decline of returns.

4.2 Data and Methodology

Stock markets experienced heavy declines during March. As provided with graphs and the unusual volatility rate during March, it is logical to assume that events, which happened during the same time period, have an impact on stock markets returns. The objective of this research is to conduct an event study, which tries to see if there is a correlation between announcement made by the WHO, which declared the Covid-19 outbreak as a world-wide pandemic, and the heavy declines in stock markets. If there is a positive correlation, this study also tries to measure the impact with the calculations for CARs.

4.2.1 Data and Time Frame

For this study only one specific event was chosen, namely the announcement by the WHO, which declared the Covid-19 outbreak as a global pandemic, on 11 March of 2020. To conduct an event study, the estimation window and the event window have to be determined. The estimation window is the window which the estimation for the market takes place, thus builds the foundation for the event window. The event window is the window, which predicts the abnormal market returns, based on the estimation window.

Figure 9: Time frames of generic event studies



$t_0 - t_1 =$ Estimation window

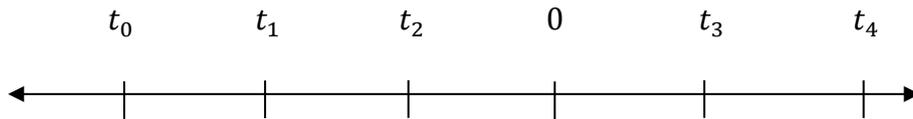
$0 =$ Calendar date of event

$t_1 - t_2 =$ Event window

Source: Own creation

In this study, for each selected stock market the estimation window was determined as 252 days, because it equals to a trade year. For the event window, five different time frames were chosen. These intervals are respectively, five and ten days before the event, the event day and five and ten days after the event.

Figure 10: Selected time frames for the event study



$$\begin{aligned}
 t_0 - t_1 &= 252 \text{ days} & 0 &= 11. \text{ March of 2020 (Announcement of WHO)} \\
 t_1 - 0 &= (-10, 0) & 0 - t_3 &= (0, 5) \\
 t_2 - 0 &= (-5, 0) & 0 - t_4 &= (0, 10)
 \end{aligned}$$

Source: Own study.

For the event study, four countries from the emerging markets and four countries from the developed markets were chosen. From the emerging markets Turkey, Brazil, Russia and China got selected, while from the developed markets Germany, France, the US and Japan got picked up. These countries were selected, because their stock market indexes showed unusual declines during March of 2020, despite being in the list of the best 20 leading economies. (World Bank, 2020). China, despite not showing unusual spikes in their stock market index during March of 2020, was simply chosen, because it's the origin country for the Covid-19 pandemic and the second strongest economy in the world (World Bank, 2020)

Table 14: Sample countries from developing countries and their stock market

Emerging Markets	
Country	Stock Index
Turkey	BIST30
Brazil	Bovespa
Russia	MOEX
China	Shanghai Composite

Table 15: Sample countries from developed countries and their stock market

Developed Markets	
Country	Stock Index
Germany	DAX
US	S&P 500
Japan	Nikkei 225
France	CAC 40

To be able to draw conclusions from stock market returns, the returns must be compared to a benchmark index. For this research, the MSCI All-Country World Equity Index was used as the benchmark index, in order to compare the stock market returns from the selected stock market indexes. The MSCI All-Country World Equity Index was selected, because this index includes information and statistical data for 23 countries from the developed markets and also 24 countries from the emerging markets, which amounts in aggregate of 47 countries stock indexes around the world (MSCI, 2023).

Table 16: MSCI All-Country World Equity Index - Emerging Markets

MSCI All-Country World Equity Index	
Emerging Markets	
Brazil - Bovespa	Chile - CLX IPSA
Colombia - COL CAP COLOMBIA	Peru – S&P/LIMA general
Mexico - S&P BMV IPC	Czechia - SE PX
Egypt - EGX	Greece - Athens’s gen composite
Hungary - BUDAPEST SE	Kuwait – Boursa Kuwait
Poland - WIG	Qatar - QE general
Saudi Arabia - TASI	South Africa - SA TOP 40
Turkey - BIST	United Arab Emirates – ADX general
China - Shanghai Composite	India - SENSEX
Indonesia - IDX composite	South Korea - KOSPI
Malaysia - KLCI	Philippines – PSEI Composite
Taiwan - TPEX	Thailand - SET

Source: MSCI, 2023. Retrieved January 23, 2023, from <https://www.msci.com/our-solutions/indexes/acwi>

Table 17: MSCI All-Country World Equity Index - Developed Markets

MSCI All-Country World Equity Index	
Developed Markets	
US - S&P 500	Singapore - STI
Canada - TSX	France - CAC 40
Austria - ATX	Germany - DAX
Belgium - BEL	Ireland - ISEQ
Denmark - OMXC	Israel - TA
Finland - OMX	Italy - FTSE MIB
Norway - OSEBX	Netherlands - AEX
Portugal - PSI	Spain - IBEX
Sweden - OMXS	Switzerland - SMI
United Kingdom - FTSE	Australia - S&P/ASX-200
Hong Kong - Hang Seng	Japan – Nikkei 225
New Zealand - NZX 50	

Source: MSCI, 2023. Retrieved January 23, 2023, from <https://www.msci.com/our-solutions/indexes/acwi>

4.2.2 Methodology

For calculating the expected market returns, there has to be an estimation model. This estimation model is used on the normal returns during the estimation window. In this study, the market model is used, for calculating the expected returns. The expected returns are calculated in the market model as equation 1:

Equation 1: Equation for expected market returns

$$E(R_{it}) = a_i + \beta_i \cdot R_{mt}$$

$E(R_{it})$ = Expected market return for each index on day t

a_i = Intercept

β_i = Slope

R_{mt} = Market return from the benchmark Index

The α and the β coefficient are calculated by a regression analysis. The regression analysis is used on the returns during the estimation window.

In order to find unusual spikes in stock market returns, the abnormal returns for each indices have to be calculated. The abnormal returns are calculated by the subtraction of the sample's market returns and the expected market returns. The calculation is as shown in equation 2.

Equation 2: Equation for abnormal returns

$$AR_{it} = R_{it} - E(R_{it})$$

AR_{it} = Abnormal returns for each index on day t

R_{it} = Market returns of the sample on day t

$E(R_{it})$ = Expected market return for each index on day t

To be able to find out a common thread in the samples, also the average abnormal returns have to be calculated. As this study takes countries from developed and also from emerging markets, this is necessary in order to compare the average returns between both markets. This comparison will allow to decide which one of these markets had a higher return, thus performed better. The average abnormal return is calculated as in equation 3.

Equation 3: Equation for average abnormal returns

$$AAR_t = \frac{1}{N} \sum_{i=1}^N AR_{it}$$

AAR_t = Average abnormal returns on day t

N = Number of the samples for each category and index

AR_{it} = Abnormal return of each index on day t

To measure the total influence of an event over a specific time, the cumulative abnormal returns have to be calculated. The cumulative abnormal returns are calculated by the summation of the abnormal returns. The formula for the calculation of cumulative abnormal returns, can be seen in equation 4.

Equation 4: Equation for cumulative abnormal returns

$$CAR(t_1, t_2) = \sum_{t_2}^{t_1} AR_{it}$$

$CAR(t_1, t_2)$ = Cumulative abnormal returns over the chosen event window

$\sum_{t_2}^{t_1} AR_{it}$ = Summation of abnormal returns during event window (t_1, t_2)

As explained in the section of average abnormal returns, to be able to determine which of the markets performed better, the average of these markets must be calculated. The cumulative average abnormal return is calculated, in order to measure the total impact of a specific event over a specific time for a specific market. The formula for the cumulative average abnormal return is shown in equation 5.

Equation 5: Equation for cumulative average abnormal returns

$$CAAR = \frac{1}{N} \sum_{i=1}^N CAR(t_1, t_2)$$

$CAAR$ = Cumulative average abnormal returns

N = Number of the samples for each category and index

$\sum_{i=1}^N CAR(t_1, t_2)$ = Summation of cumulative abnormal returns, during the event window (t_1, t_2).

After the returns got calculated, the results have to be determined if they are relevant or not, meaning that they need to be tested for their significance. In this study, for testing the calculated results, t-statistics thus the t-test is used.

For calculating the significance of the event day, the t-test formula for abnormal returns has to be used. The t-statistic is calculated, when the abnormal return on the event day is divided by the standard error. Standard error is calculated by the standard deviation of stock and market returns, during the estimation window. The formula for the t-statistics on the event day, is as followed;

Equation 6: T-statistics for event day based on abnormal returns

$$t_{AR} = \frac{AR_{it}}{S_{AR_i}}$$

t_{AR} = T statistics for the event day

AR_{it} = Abnormal returns on the event day

S_{AR_i} = Standard deviation of stock and market returns, during the estimation window

For testing the cumulative abnormal returns' significancy in their respective event window, the CAR t-test is used. The formula for the CAR t-test is as followed;

Equation 7: Calculation of t-statistics for cumulative abnormal returns

$$t_{CAR} = \frac{\frac{CAR_{it}}{N}}{\frac{S_{AR_i}}{\sqrt{N}}}$$

t_{CAR} = T statistics for cumulative abnormal returns

CAR_{it} = Cumulative abnormal returns during the respective event window

N = Number of days during the respective event window

S_{AR_i} = Standard deviation of stock and market returns, during the estimation window

In order to test the significancy of the cumulative average abnormal returns for their respective time frame, the formula in equation 8 is used.

Equation 8: Calculation of t-statistics for cumulative average abnormal returns

$$t_{CAAR} = \frac{CAAR_t}{S_{AAR_t} \cdot \sqrt{N}}$$

t_{CAAR} = T statistics for cumulative average abnormal returns

$CAAR_t$ = Cumulative average abnormal returns during the respective event window

S_{AAR_t} = Standard deviation of average abnormal returns during event window

N = Number of days during the respective event window

4.2.3 Interpretation of T-statistics

The obtained t-statistics are used for testing the studies' hypothesis. The null hypothesis of this research is, that the announcement by the WHO on 11. March of 2020, which declared the Covid-19 outbreak around the globe as a pandemic, did not had a significant impact on the selected stock markets. The neglection of the null hypothesis means that the announcement had indeed a statistically significant impact on the selected stock markets.

H_0 : The Covid-19 outbreak being declared as a global pandemic by the WHO on 11. March of 2020, did not have a significant impact on the selected stock markets.

H_1 : The Covid-19 outbreak being declared as a global pandemic by the WHO on 11. March of 2020, did have a statistically significant impact on the selected stock markets.

If the absolute value of the t-statistic is higher than the critical value of 1.96, it means that the ARs, CARs and CAARs, are all statistically significant. On the other hand, if the absolute value of the t-statistic is lower than 1.96, its statistical insignificant.

4.3 Results and Interpretation of Quantitative Analysis

4.3.1 CAR Results: Before the Event Day

Table 18: CAR T-test statistics from the stock markets of developing countries before the event

Country	CAR (-10,0)	CAR (-5,0)	CAR t-test (-10,0)	CAR t-test (-5,0)
BIST 30	-0.06930	-0.05985	-1.50503	-1.83816
Bovespa	-0.12462	-0.08083	-2.76988**	-2.54071*
MOEX	-0.19795	-0.08927	-6.36242***	-4.05783**
Shanghai Composite	0.02031	0.01657	0.52738	0.60841

***, **, * indicates statistical significancy at 1% ($p < 0,01$), 5% ($p < 0,05$) and 10% ($p < 0,1$) respectively

From Table 18, the CARs from the selected countries' stock markets show mostly negative returns for the period before the announcement. Only the Chinese stock market Shanghai Composite, despite China being the origin country of the Covid-19 outbreak, shows positive CARs.

When looked into the event window (-10,0), it can be observed that the Russian stock index MOEX was impacted with a decline of CARs by 19,75% the most, while the Brazilian stock market Bovespa, became the second affected stock market. BIST 30, the Turkish stock market showed also negative CARs, but performed better than MOEX and Bovespa. As can be seen, the results for MOEX and also for Bovespa are statistically significant.

When focused on the event window of (-5,0) the ranking of the performances between the selected stock markets didn't change. But interestingly, both stock markets MOEX and Bovespa, performed a lot better than their previous event window, despite being close to the announcement day. BIST 30 on the other hand showed only a slight increase of performance, while the Shanghai Composite had a slightly decrease. As seen, the results for both MOEX and Bovespa, are statistically significant.

Table 19: CAR T-test statistics from the stock markets of developed countries before the event

Country	CAR (-10,0)	CAR (-5,0)	CAR t-test (-10,0)	CAR t-test (-5,0)
DAX	-0.13580	-0.09558	-4.38608***	-4.36589***
S&P 500	-0.00427	0.00667	-0.14857	0.32872
Nikkei 225	-0.09340	-0.03804	-3.08822**	-1.77882
CAC 40	-0.13644	-0.11034	-4.44010***	-5.07793***

***, **, * indicates statistical significancy at 1% ($p < 0,01$), 5% ($p < 0,05$) and 10% ($p < 0,1$) respectively

From Table 19, it can be observed that all stock markets from the selected developed countries show negative CARs for the event window of (-10,0). In contrast to the event window (-10,0), the US stock market S&P 500 displays an exception in the event window (-5,0), for being the only stock market that has positive CARs.

For the event window (-10,0) it can be seen that the German stock market DAX and that the French stock market CAC 40 performed similar. Both stock markets had negative CARs approximately of 13,5%, which means that both had the worst performances amongst the selected developed countries' stock markets. The Japanese stock market Nikkei 225 showed a negative CAR of 9,34%, therefore didn't perform well either. The US stock market S&P 500 performed the best amongst developed countries' stock markets, as they had a slightly positive CAR. As can be seen, the results for DAX, Nikkei 225 and CAC 40 are statistically significant.

The event window for (-5,0) shows for all stock markets positive in their CAR, but the ranking of the performances is still the same as the event window (-10,0) and (-5,0). The most important change happened in the Japanese stock market Nikkei 225. As can be observed, the t-statistics for the Japanese stock market during event window (-5,0) became statistical insignificant. This could be interpreted as, that the overall environment during Covid-19 outbreak has only a significance on a broader time frame for the Japanese stock market. The t-statistic for S&P 500 showed in both event windows no significance, while it's the t-statistic for DAX and CAC 40 remained statistically significant in both event windows.

4.3.2 AR Results: On Event Day

For the results of the event day, this study takes 12. March of 2020 as a reference point. The announcement by the WHO was on March 11 of 2020, but the impact of similar announcements is mostly seen directly the day after, because announcements are mostly made by mid-day, thus leaving no room for stock markets to react. Another reason for this decision is also to take the time differences into consideration, because when the announcement was made, some countries had already their stock markets closed.

Table 20: AR T-test statistics from the stock markets of developing countries on event day

Country	AR (0,1)	AR t-test (0,1)
BIST 30	-0.03137	-2.14990***
Bovespa	-0.07779	-5.45689***
MOEX	-0.07997	-7.99937***
Shanghai Composite	0.01010	0.82726

***, **, * indicates statistical significancy at 1% ($p<0,01$), 5% ($p<0,05$) and 10% ($p<0,1$) respectively

From the ARs it can be concluded, that the Russian stock market MOEX and the Brazilian stock market Bovespa performed the worst on the event day. Both stock markets had negative AR's approximately around 7,8-8,0% on the event day. The Turkish stock market BIST 30, despite having negative ARs too, performed better than MOEX and Bovespa. If we look into the t-statistics, the conclusion can be drawn that these negative ARs, which happened on the event day, are connected to the announcement as they are statistically significant. The Chinese stock market Shanghai Composite had a slightly positive AR, thus performed the best amongst the selected emerging markets on the event day. It can be concluded that the day of announcement of the global pandemic, did not have an impact on the Chinese stock market as its statistically insignificant. Since China is the origin country of Covid-19, this result is interesting as the announcement lead not to unusual returns.

Table 21: AR T-test statistics from the stock markets of developed countries on event day

Country	AR (0,1)	AR t-test (0,1)
DAX	-0.06596	-6.72396***
S&P 500	-0.02300	-2.52882***
Nikkei 225	-0.01316	-1.37332
CAC 40	-0.06633	-6.81250***

***, **, * indicates statistical significancy at 1% ($p<0,01$), 5% ($p<0,05$) and 10% ($p<0,1$) respectively

When looked into the selected developed countries' stock markets, the German DAX and the French CAC 40 showed similar performances in their ARs on the event day. Like their ARs' in the event window (-10,0) and (-5,0), the DAX and CAC 40 had the worst ARs on the event day as well. The US stock market, which

had slightly positive returns in the prior event window (-10,0) and (-5,0), showed on the event day a negative AR of 2,3%. According to the US stock market t-statistic results it can be said that the declaration from WHO was indeed a factor for the decrease in their ARs on the event day. The Japanese stock market Nikkei 225, experienced a negative abnormal return on the event day as well, yet shows no connection to the announcement on 11. March. As can be observed their t- statistics show statistical insignificance. The t-statistics for DAX and CAC 40 show statistical significance, thus it can be concluded that their highly negative AR on the event day is connected to the declaration made by the WHO.

4.3.3 CAR Results: After the Event Day

Table 22: CAR T-test statistics from the stock markets of developing countries after the event

Country	CAR (0,5)	CAR (0,10)	CAR t-test (0,5)	CAR t-test (0,10)
BIST 30	-0,09518	-0,09376	-2,92363**	-2,03631*
Bovespa	-0,09331	-0,01846	-2,93306**	-0,41023
MOEX	-0,15973	-0,00828	-7,26036***	-0,26602
Shanghai Composite	-0,04415	-0,04184	-1,62100	-1,08627

***, **, * indicates statistical significance at 1% ($p < 0,01$), 5% ($p < 0,05$) and 10% ($p < 0,1$) respectively

From Table 22 it can be noted that all CARs, without any exceptions, are negative for the selected developing countries, in both event windows after the announcement on March 11.

When looked into the event window (0,5), it can be observed that the Russian stock market MOEX got impacted the heaviest amongst other stock markets with a negative CAR of 15,97%. In their t-statistics, it can be seen that their result shows statistical significance, thus can be concluded that their highly negative CAR is connected to the declaration made by the WHO on March 11. The Turkish stock market BIST 30 and the Brazilian stock market Bovespa, showed highly similar performance during the same event window. Both stock markets had negative CARs of 9,51% and 9,33% respectively. Both stock markets' t-statistic results show statistical significance. This means, that the Covid-19 pandemic announcement made by the WHO, influenced both stock markets and is one of the reasons for their

negative CAR, during the event window (0,5). The Chinese stock market Shanghai Composite, showed also negative CARs for the same event window however, despite being the origin country of Covid-19 outbreak, their decline is not related to the announcement, as their t-statistics show a statistical insignificance. This is coherent with the results of the event window (0,1), which did not show ARs even directly after the announcement.

In the event window (0,10), the CARs from the selected developing countries increased, despite still showing negative CARs. Though, not all stock markets increased the same i.e., BIST 30 and Shanghai Composite performed only slightly better than the previous event window (0,5), while Bovespa and MOEX performed much better in comparison to the prior event window (0,5). As emphasized, the Turkish stock market BIST 30 and the Chinese stock market Shanghai Composite performed in the event window (0,10) almost like they did in the previous event window (0,5). When looked into their t-statistics for the event window (0,10), it can be observed that the t-statistics for the Turkish stock market BIST 30 shows a positive correlation with the Covid-19 declaration made by the WHO, while the Chinese stock market Shanghai Composite shows an insignificance towards the same announcement. As mentioned, the performance of the Brazilian stock market Bovespa and the Russian stock market MOEX increased in the event window (0,10), but both stock markets showed still negative CARs. An important difference in the event window (0,10) is seen, when looked into their t-statistics. In contrast to the short-term event window (0,5), both stock markets Bovespa and MOEX show statistical insignificance towards the announcement on March 11 for the event window (0,10). These results imply that the declaration of WHO, which announced that the Covid-19 outbreak will be treated as a global pandemic, had only a spontaneous impact to the both stock markets Bovespa and MOEX. This can be interpreted as that the shock from the announcement was not long lasting. This is in coherence with Figure 7, which shows that both stock markets start a continuous trend towards recovery in late and after march.

Table 23: CAR T-test statistics from the stock markets of developed countries after the event

Country	CAR (0,5)	CAR (0,10)	CAR t-test (0,5)	CAR t-test (0,10)
DAX	-0,11134	0,01558	-5,08557***	0,50316
S&P 500	-0,00157	-0,01434	-0,07757	-0,49935
Nikkei 225	-0,09631	0,00054	-4,50359**	0,01794
CAC 40	-0,10267	0,03415	-4,72486***	1,11123

***, **, * indicates statistical significancy at 1% ($p < 0,01$), 5% ($p < 0,05$) and 10% ($p < 0,1$) respectively

From Table 23, it can be observed that the performances of the selected developed countries' stock markets, highly differ from the performances of stock markets in developing countries. When looked closer into their CARs, it can be observed that the performances for event window (0,5) is similar as in the developing countries, but when looked into the event window (0,10), it can be seen that the developed countries' stock markets performed much better, than the stock markets in developing countries. This can be concluded by the positive CARs, which the stock markets of developing countries did not have for the event window (0,10).

When looked at the event window (0,5), it can be concluded that the US stock market S&P 500 performed the best amongst the selected stock markets from developed countries, as their stock market did show only a slightly negative CAR. This is fitting to the result, that their t-statistics show a statistical insignificancy for the event window (0,5). The German stock market DAX, the Japanese stock market Nikkei 225 and the French stock market CAC 40 performed similar in the event window (0,5), as their CARs were highly negative, between in the range of -9,5% - 11,5%. All three stock markets' t-statistics show a significant correlation between the highly negative CARs and the announcement made by the WHO for the event window (0,5).

In the event window (0,10), with the exception of S&P 500, almost all performances of stock markets from the selected developed countries increased immensely. The German DAX, the Japanese Nikkei 225 and the French CAC 40 showed even positive CARs. The French CAC 40, has performed the best amongst the other stock markets as it had a positive CAR of 3,41%. This marks an increase in their CARs of approximately 13,5% from the previous event window (0,5). The German stock

market DAX, experienced also a huge increase of 11% in their CARs in comparison to the prior event window (0,5). The Japanese Nikkei 225, performed also a lot better in the event window (0,10) as they showed an increase of 9,5% in their CARs. As mentioned, the US stock market S&P 500 is the only stock market from the selected developed countries, which showed a decline in their CARs in comparison with the event window (0,5). Also, an important difference in contrast to the event window (0,5) is, that all selected stock markets from the developed countries, without any exception, show a statistical insignificance towards the declaration made by the WHO, as their t- statistics indicate. From this result it can be deducted, that the Covid-19 declaration had only a short-lasting impact on the selected developed countries' stock markets, since in the long-term event window it can be seen that the stock markets from developed countries show no correlation anymore with the Covid-19 announcement on March 11. Such an outcome is coherent with the Figure 5, as all selected stock markets from developed countries, show a continuous trend of recover in late and after March. In short, the influence of the announcement was only significant for the first 5 days after the announcement, for the selected stock markets from developed countries.

4.3.4 CAAR Results: Before the Event Day

Table 24: CAAR T-test statistics for developed and developing countries' stock markets before the event

Stock market	CAAR (-10,0)	CAAR (-5,0)	CAAR t-statistics (-5,0)	CAAR t-statistics (-10,0)
Developed Countries	-0,09188	-0,05932	-4,37958***	-4,79678***
Developing countries	-0,09289	-0,05334	-3,38448***	-4,16730***

***, **, * indicates statistical significancy at 1% ($p < 0,01$), 5% ($p < 0,05$) and 10% ($p < 0,1$) respectively

From Table 24, the CAAR of the selected stock markets from developed and developing countries, have performed similar in both event windows before the Covid-19 Pandemic announcement. Stock markets from developed and developing countries show in both event windows a statistical significancy. This can be

interpreted as that the general environment during Covid-19 outbreak affected stock markets, regardless their level of development.

4.3.5 CAAR Results: After the Event Day

Table 25: CAAR T-test statistics for developed and developing countries' stock markets after the event

Stock market	CAAR (0,5)	CAAR (0,10)	CAAR t- statistics (0,5)	CAAR t- statistics (0,10)
Developed Countries	-0,07797	0,00898	-5,75648***	0,46895
Developing countries	-0,07878	-0,04058	-4,99852***	-1,82073

***, **, * indicates statistical significancy at 1% ($p < 0,01$), 5% ($p < 0,05$) and 10% ($p < 0,1$) respectively

If analysed the CAARs in Table 25, it can be observed that stock markets from developed and developing countries, show almost the same numbers for the short event window (0,5), namely an average decline of -7,8%. But this situation changes for the long event window (0,10). As can be seen, the CAAR from the stock markets of developed countries, is much higher, than the CAARs from stock markets of developing countries. This implies that the selected stock markets from developed countries, performed better than the stock markets in developing countries for the long event window. The CAAR t-statistics supports the claim that the Covid-19 announcement on March 11, had only a statistical significancy for the short event window (0,5).

4.4 Discussion

When looked into the overall results of the event study, it can be observed that the announcement from the WHO, which declared the Covid-19 outbreak as a global pandemic, had mostly short-lasting spontaneous impact on stock markets. Rather the developed stock markets or rather the developing markets, there is almost no difference. Both markets in general, got impacted heavily on short-term event window. In both markets, the CARs were mostly highly negative for the short time frame (0,5).

For the event window (0,10) the impact is quite the opposite. This can be observed by the fact that the effect of the declaration gets lesser and lesser each passing day, as their CARs show statistical insignificance as the event window goes longer. The decline in the impact is in coherency with the status of recover after the event days. The only exception for this statement is the Turkish stock market BIST 30, which shows a correlation and thus a statistical significance towards the announcement made by the WHO.

The US stock market S&P 500 is the only stock market, which showed a reaction and correlation only on the event day (0,1). This can be interpreted as that the initial shock for investors was very short-lived, thus helped that no investor behaved as they would indicate panic. The Japanese stock market Nikkei 225 is the only stock market amongst others, which didn't show a significant reaction on the event day. As shown in Table 23, Nikkei 225 experienced a significant impact by the announcement in the event window (0,5), therefore it can be interpreted as that the Japanese stock market and their investors showed a delay in reaction in the financial markets on the event day (0,1).

The CAAR was used, to be able to categorize and distinguish between the performances of stock markets in developing and developed countries. As can be concluded from CAARs the selected developed countries' stock markets, had in aggregate a better performance than the selected stock markets in developing countries.

The results of this event study show in general coherency with other conducted works, as the event study from He et al. (2020) in which was reached the conclusion, that the announcement from March 11 only affected the stock markets for a short period. Their study could not find a statistical significance towards the announcement for the event window 11 March – 22 March, for the developed countries' stock markets: DAX, S&P 500 and CAC 40 as well.

On the other hand, there are also some distinctions from other works. Pandey and Kumari (2020) found out, that the stock markets from developed countries got impacted much more than the stock markets of emerging countries. This is in contrast to the results of the conducted event study, as the results show the opposite. The CARs of stock markets from developed countries, were higher than the CARs

of stock markets from developing countries. The reason for this distinction, between this event study and the study conducted by Pandey and Kumari (2020), could lay on the number of the sample countries, as they used 25 countries in aggregate (12 emerging, 13 developed markets). Due to the limitation of being a thesis, this study had to focus on a narrower size of sample countries. But despite this, there are still coherences with the same study as well, like that the Covid-19 outbreak lead to mostly negative CARs or the same finding that the American stock markets showed insignificancy towards the Covid-19 pandemic declaration.

This event study had the intention to enrich the studies which focused on the Covid-19 Pandemic, because of the weight of impact it had on the daily lives. This event study can be can be enlarged more than one way. One option would be the increase of country samples. Other option could contain a regional analysis to see which regions in the world got impacted the most. Another possibility to improve would be using different empirical tests than t-statistics.

5. Conclusion and Further Recommendations

From the quantitative analysis' results and figures, it can be concluded that March of 2020 was the month, when the pandemic reached its peak around the globe. This is supported by the fact, that March was the month when the WHO declared the Covid-19 outbreak as a pandemic and by the fact that pharmaceutical researches for producing vaccines and testing kits peaked during this month as Covid-19 cases and death started sharply to increase.

When looked into the sectors, it is evident that the most affected sector negatively was the airline industry as international travel got hit the most. Other sectors which got impacted heavily negatively towards the Covid-19 Pandemic, are the energy and automobile sector, due to the fact that many factories had to shut down their operation during the pandemic. On the other hand, there are sectors which also flourished and experienced sectoral growth during the Covid-19 Pandemic. One of these sectors is the textile industry, which had a largest sectoral growth due increased production of face masks. Other sectors which experienced a sectoral growth are the pharmaceutical industry because of the heavy investments in vaccination and testing kits and also IT sector as digitalization became an important of daily lives, due to remote work and remote education.

Almost all stock markets, except for China's stock market, experienced large crashes during March. From the sample countries, Brazil's stock market Bovespa experienced the sharpest decrease with 46%. Other stock markets from the sample countries had a decline between 30%-40%. March of 2020 was a turbulent period for the stock markets, which is supported by their volatility rates. The sample countries from developed countries had pre-Covid-19 an average monthly volatility rate of 3%-4%, while during March they had a monthly volatility rate between 17%-28%. The same goes for the sample countries from developing countries. The developing countries had pre-Covid-19 an average monthly volatility rate of 3%-6%, but during March their volatility rate reached a range between 9%-36%.

From the conducted event study, it can be concluded that the effect of the Covid-19 Pandemic declaration on stock market returns were mostly negative and caused losses on the stock markets, but the impact was short-lasting as the losses were mostly focused on 11. March – 16. March. This is supported by the fact, that after March almost all stock markets started to increase continually, meaning that they have entered a period of recovery.

As a conclusion it can be said that, despite the heavy initial shock by the Covid-19 Pandemic, the recession on stock markets and on the GDPs of countries were short-lived. If compared to the Great Depression, which is the largest global financial crisis the globe experienced, the deep initial impact of the Covid-19 Pandemic might be similar, but when analysed the lasting time, it cannot come close to the Great Depression. This claim is also supported by the report from National Bureau of Economic Research, which shows that the recession in the US only lasted 2 months from March till the end of April (Cox, 2021).

This thesis can be expanded by a deeper focus on sectors, especially it could be interesting to examine the correlation between the Covid-19 Pandemic and the stock market returns of pharmaceutical companies, which worked and conducted researches on the Covid-19 vaccines. This can be done also by an event study like this thesis conducted. The reference point could be chosen as the announcements by the pharmaceutical companies, the time they started to work and conduct researches on vaccines.

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